| Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy | | | | | | | | | | | Date: March 2023 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603713N *I Ocean Engineering Tech Dev* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2022** | **FY 2023** | **FY 2024 Base** | **FY 2024 OCO** | **FY 2024 Total** | **FY 2025** | **FY 2026** | **FY 2027** | **FY 2028** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 82.450 | 8.547 | 6.193 | 10.751 | - | 10.751 | 16.961 | 10.528 | 9.446 | 8.810 | Continuing | Continuing |
| 0099: *Deep Submergence Bio Med Dev* | 49.227 | 4.354 | 3.082 | 2.433 | - | 2.433 | 3.746 | 3.454 | 3.348 | 3.415 | Continuing | Continuing |
| 0394: *Shallow Depth Diving EQ* | 33.223 | 4.193 | 3.111 | 8.318 | - | 8.318 | 13.215 | 7.074 | 6.098 | 5.395 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Developments in this program will enable the U.S. Navy to overcome deficiencies that constrain manned diving operations in several critical areas such as submarine rescue, recovery, salvage, underwater ship husbandry, underwater construction and naval special operations. This program develops biomedical technology, diver life support equipment, and the systems, tools, and procedures to permit manned underwater operations and enhance diver performance and safety.

| B. Program Change Summary ($ in Millions) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 8.774 | 6.193 | 6.442 | - | 6.442 |
| Current President's Budget | 8.547 | 6.193 | 10.751 | - | 10.751 |
| Total Adjustments | -0.227 | 0.000 | 4.309 | - | 4.309 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.227 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 4.261 | - | 4.261 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.048 | - | 0.048 |

**Change Summary Explanation**

The FY22 reduction of $0.227M is the final SBIR assessment. FY24 increase of $4.309M is to fund the Submarine Rescue System Modernization Program. Increase is required by the Navy in order to provide a credible U.S. Submarine Rescue System (SRS) for our sailors and ally partner nations. As part of detailed review, Navy determined the system had not been funded sufficiently to properly modernize the system and FY24 budget increase is to support this. The modernization of SRS is required to address known reliability and obsolescence issues and support the planned minimum 15 year system service life extension prior to SRS's end of life and inoperability.

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | | Date: March 2023 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0099 / *Deep Submergence Bio Med Dev* | |

| COST ($ in Millions) | Prior Years | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total | FY 2025 | FY 2026 | FY 2027 | FY 2028 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0099: *Deep Submergence Bio Med Dev* | 49.227 | 4.354 | 3.082 | 2.433 | - | 2.433 | 3.746 | 3.454 | 3.348 | 3.415 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project:
1) Develops advanced biomedical and bioengineering technology for medical and life support enhancement to decrease submariner deaths and permanent injury in a disabled submarine (DISSUB) and during submarine escape and rescue;
2) Conducts research for diver health, safety, and effectiveness to increase understanding of human performance and enhanced diver stress management and survivability in high stress environments such as in cold/warm water and at altitude. This project also validates and improves the accuracy of assumptions associated with equipment testing and certification, diving procedures, and diver biomedical physiology.

Deliverables for DISSUB include: medical guidance/procedures increasing submariner survivability for submarine escape and rescue (including new Submarine Rescue Diving and Recompression System (SRDRS)), life support parameters, medical procedures for life support; exposure and mitigation guidance for atmospheric contaminants, high levels of oxygen and/or carbon dioxide; prevention and treatment of decompression sickness and pulmonary oxygen toxicity; and senior survivor expert decision system.

Deliverables for diver health and safety include: decompression guidance in extreme environment diving with various breathing mixtures, temperatures, durations, and altitudes; exposure guidance for oxygen breathing; diver performance guidance based on physiological effects of diving; enhanced underwater swimming efficiency; enhanced diver thermal protection; collection of operational diving depth/time profiles to predict decompression risk, and exposure and mitigation guidance for divers experiencing underwater continuous noise, impulse noise, or underwater blast.

Requirements:
OPNAVINST 3150.27D, Navy Diving Policy and Joint Military Diving Technology and Training Program, 01 Mar 2021
Navy Salvage and Navy Diving Capabilities-Based Assessment (CBA) Report, 19 Dec 2013
NAPDD #587-873, Deep Submergence Biomedical Development, 23 Nov 1999
NAVSEA Instruction 3900.10A, Management of the Deep Submergence Biomedical Research and Development Program, 6 Nov 2018
Navy Diving Initial Capabilities Document (ICD)

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| ***Title:*** Deep Submergence Bio Med Dev - Diver Health and Safety | 2.958 | 1.744 | 1.055 | 0.000 | 1.055 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| ***Description:*** Diver Health and Safety Research: Novel methods for decompression safety and treatment of decompression sickness/arterial gas embolism. Advanced decompression models for extreme environments, including thermally challenging, long duration, multi-gas, and/or diving at altitude. Diving physiology advances in exercise, thermal exposure, oxygen/carbon dioxide alterations, other gas mixture alternations, hydration, and sustained operations. Develop pulmonary oxygen toxicity exposure limits. Provide pulmonary and Central Nervous System (CNS) oxygen toxicity mitigation strategies. Develop an advanced diver thermal model. Develop advanced insulation garments for diver thermal protection. Develop guidance for optimizing thermal control during decompression. Develop guidelines for conduct of diving operations at altitude. Develop guidance for infra- and ultra-sound diver exposure. Continue collection of operational and research dive data for inclusion in advanced probabilistic decompression models. Investigate diver in-water maladies. Develop/improve real-time decompression guidance and dive planning. Research procedures for assessing and mitigating risk for diving in contaminated water.<br><br>***FY 2023 Plans:***<br>*Multi-Year Project Support: Completion of projects initiated in prior fiscal years will be supported where progress is deemed acceptable and project goals remain valid and attainable.<br><br>*Diver Hearing Conservation: Continue work to quantify acoustic exposures to divers and thus support hearing loss risk mitigation. Develop an underwater noise dosimeter for determining real-time diver noise/blast exposure.<br><br>*Central Nervous System (CNS) O2 Toxicity Mitigation: Continue to evaluate ketone ester supplement in prevention of CNS O2 Toxicity.<br><br>*Swimming Induced Pulmonary Edema (SIPE): Continue to evaluate SIPE in NSW candidates to characterize the disease, mitigation strategies and screening tools for at risk personnel.<br><br>*Surface-supplied helium-oxygen decompression table modernization: Continue to validate, via manned diving, a new probabilistic surface-supplied helium-oxygen decompression table derived from new modeling techniques that addresses critical gaps in current tables to improve diver safety and operational efficiency.<br><br>*Decompression Sickness (DCS) models to allow for real-time optimization of dive profiles: Continue to use new computer technology and techniques to accelerate, optimize and evaluate DCS models to support this effort. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| *Continue evaluation of a new approach to decompression in an animal model by breathing a different gas (perfluoromethane, CF4) from the one used during the dive to reduce decompression time and enhance safety.<br><br>*Evaluate the effects of respiratory muscle training on carbon dioxide retention.<br>***FY 2024 Base Plans:***<br>*Multi-Year Project Support: Completion of projects initiated in prior fiscal years will be supported where progress is deemed acceptable and project goals remain valid and attainable.<br><br>*Diver Hearing Conservation: Continue underwater noise dosimeter development for determining real-time diver noise/blast exposure.<br><br>*Central Nervous System (CNS) O2 Toxicity Mitigation: Continue to evaluate ketone ester supplement in prevention of CNS O2 Toxicity.<br><br>*Swimming Induced Pulmonary Edema (SIPE): Continue to evaluate SIPE in NSW candidates to characterize the disease, mitigation strategies and screening tools for at risk personnel.<br><br>*Continue evaluation of the effects of respiratory muscle training on carbon dioxide retention.<br>***FY 2024 OCO Plans:***<br>N/A<br>***FY 2023 to FY 2024 Increase/Decrease Statement:***<br>Decrease of -0.689M from FY 2023 to FY 2024 will eliminate funding for two (2) contaminated water diving studies on diver thermal protection and diving guidance methods. | | | | | |
| ***Title:*** Deep Submergence Bio Med Dev - Submarine Escape & Rescue | 1.396 | 1.338 | 1.378 | 0.000 | 1.378 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Submarine Rescue/Escape Research: Provide decompression procedures for pressurized Submarine Rescue Diving and Recompression System (SRDRS) operators. Investigate adjunctive therapies for treating Disabled Submarine (DISSUB) survivors. Provide updated guidance for food, water, clothing, medical supplies, to enhance survival of submarine crews awaiting rescue. Develop/provide flexible computer-generated decompression schedules for wide range of conditions in a DISSUB. Develop DISSUB medical triage | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| procedures and support DISSUB survival trials. Develop mitigation strategies to reduce hyperbaric oxygen exposures in closed vehicles/compartments. Develop treatment guidance for decompression sickness and arterial gas embolism in submarine escape and rescue. Investigate the use of novel pharmacologic agents to reduce decompression risk and/or oxygen toxicity in submarine rescues. Develop/deploy toxic gas analyzer for use in pressurized DISSUB rescue. Investigate interventions for toxicological problems in DISSUB survivors. Develop strategies to minimize decompression sickness and arterial gas embolism with Submarine Escape and Surface Survival Personnel Equipment (SESSPE) training.<br><br>***FY 2023 Plans:***<br>*Multi-Year Project Support: Completion of projects initiated in prior fiscal years will be supported where progress is deemed acceptable and project goals remain valid and attainable.<br><br>*Assess Impact of CO2 on Pressurized DISSUB survival: Continue animal research to answer the question regarding whether elevated CO2 levels will accelerate onset of Pulmonary O2 Toxicity and increase mortality during high internal pressure DISSUB scenarios.<br><br>*Continue Independent Validation & Verification (IV&V) of the USN Submarine Rescue System (SRS) Decompression App to validate tool as rapid, real-time tracker and reference guide for use in a DISSUB rescue compliment the SRS Planner manual.<br><br>* Evaluation of Guard Book Calculation Methods: Continue recommendations for how those errors can be eliminated through procedural changes or edits to the existing format(s).<br><br>*Manned Testing of Specialized Surface Decompression procedures for DISSUB rescue without transfer under pressure: Continue manned testing to validate these procedures.<br><br>*Prototype development and transition of a device to detect Submarine Escape Action Limits (SEAL) levels for the seven contaminants of interest in real time and down to pressures as high as 5 ATA to replace the maligned, difficult to operate frequently inaccurate Draeger tubes currently onboard USN submarines.<br>***FY 2024 Base Plans:***<br>*Multi-Year Project Support: Completion of projects initiated in prior fiscal years will be supported where progress is deemed acceptable and project goals remain valid and attainable. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| *Complete prototype development and transition of a device to detect Submarine Escape Action Limits (SEAL) levels for the seven contaminants of interest in real time and down to pressures as high as 5 ATA to replace the maligned, difficult to operate frequently inaccurate Draeger tubes currently onboard USN submarines.<br><br>*Assess Impact of CO2 on Pressurized DISSUB survival: Complete animal research to answer the question regarding whether elevated CO2 levels will accelerate onset of Pulmonary O2 Toxicity and increase mortality during high internal pressure DISSUB scenarios.<br><br>***FY 2024 OCO Plans:***<br>N/A<br><br>***FY 2023 to FY 2024 Increase/Decrease Statement:***<br>Increase of +$0.04M from FY 2023 to FY 2024 will provide a modest increase for labor costs associated with labor intensive human and animal subject projects across these two fiscal years. This allocation reflects continued strong interest in addressing challenging, real-time physiologic problems related to enhancing diver performance and range of operations. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.354 | 3.082 | 2.433 | 0.000 | 2.433 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Integrated thrust area teams (e.g., decompression research) are established with university, commercial, and in-house Navy labs to jointly execute biomedical Research and Development (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 Undersea Medical Officer. Contracting by competitive process using Business Area Analysis (BAA) and leveraging Office of Naval Research (ONR) capabilities.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation (DT&E) | WR | NEDU : Panama City, FL | 26.136 | 0.899 | Dec 2021 | 0.451 | Nov 2022 | 0.140 | Nov 2023 | - | | 0.140 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation (DT&E) | WR | NMRC : Silver Spring, MD | 12.899 | 0.000 | | 0.200 | Nov 2022 | 0.330 | Nov 2023 | - | | 0.330 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation (DT&E) | C/FFP | DUKE UNIV : Durham, NC | 4.910 | 1.056 | Mar 2022 | 0.746 | Nov 2022 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation (DT&E) | C/FFP | SUNY : Buffalo, NY | 2.795 | 0.325 | Apr 2022 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation (DT&E) | C/CPFF | JHU APL : Laurel, MD | 0.964 | 0.296 | Jan 2022 | 0.312 | Nov 2022 | 0.333 | Nov 2023 | - | | 0.333 | 0.000 | 1.905 | - |
| Developmental Test & Evaluation (DT&E) | WR | NAVWAR : San Diego, CA | 0.453 | 0.205 | Dec 2021 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.658 | - |
| Developmental Test & Evaluation (DT&E) | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.002 | Nov 2023 | - | | 1.002 | 0.000 | 1.002 | - |
| Developmental Test & Evaluation (DT&E) | C/FFP | ASHWIN-USHAS CORP: : Marlboro, NJ | 0.345 | 0.386 | Jun 2022 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.731 | - |
| Developmental Test & Evaluation (DT&E) | C/CPAF | GPC : Irvine, CA | 0.000 | 0.250 | Jun 2022 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| Developmental Test & Evaluation (DT&E) | WR | NSMRL : Groton, CT | 0.000 | 0.869 | Apr 2022 | 1.025 | Nov 2022 | 0.277 | Nov 2023 | - | | 0.277 | 0.000 | 2.171 | - |
| Developmental Test & Evaluation (DT&E) | C/BA | UCSD : San Diego, CA | 0.000 | 0.000 | | 0.161 | Nov 2022 | 0.166 | Nov 2023 | - | | 0.166 | 0.000 | 0.327 | - |
| | | **Subtotal** | 48.502 | 4.286 | | 2.895 | | 2.248 | | - | | 2.248 | Continuing | Continuing | N/A |

**Remarks**

1. There is a notable decrease in the program funding allocation to NEDU, SUNY Buffalo, JHU APL and NAVWAR in FY23. This relates to the planned funding and completion of projects at the end of FY22 for these institutions. Proposal submissions were either not submitted or not selected for funding for FY22 and subsequent out-years.
2. Costs shown as 'various' reflect the funds that will be used to sponsor future research. Just as the funding control for FY-24 is a projection of funds to be allocated for continuing the work performed by the Deep Submergence Biomedical Development Program, these 'various' funds are yet-to-be assigned funds, based on the established PBIS controls, for work that will start in that future year (in this case FY-24). The exact details of the studies initiated with these funds will be determined as part of the established annual project selection process, as defined in NAVSEAINST 3900.10A and under BAA-21-G-01. These are not discretionary funds, but rather funds allocated for future, to-be-determined research, according to established guidelines.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

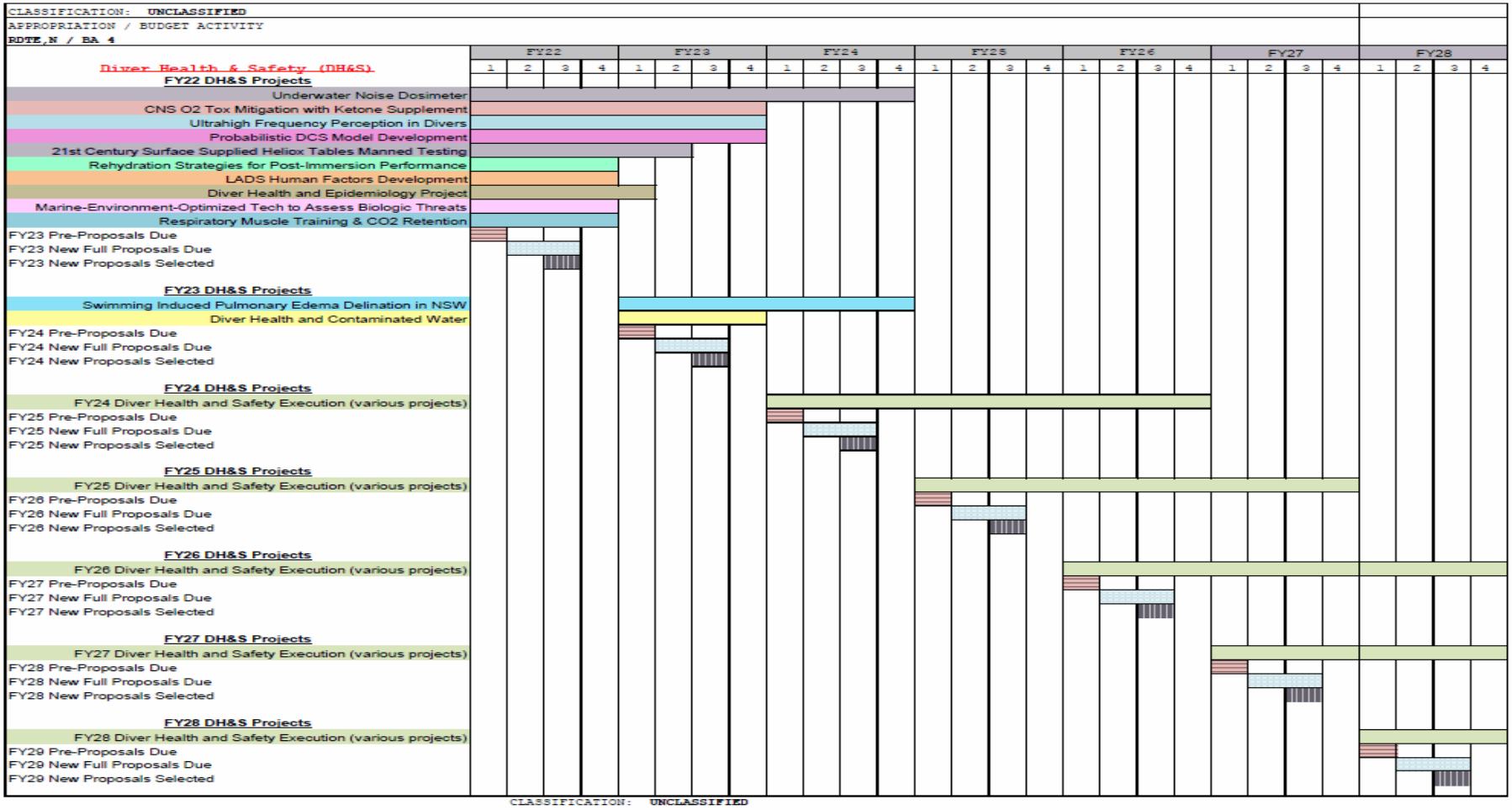
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Various | Various : Various | 0.725 | 0.068 | Aug 2022 | 0.064 | Aug 2023 | 0.060 | Aug 2024 | - | | 0.060 | Continuing | Continuing | Continuing |
| SBIR Assessment | Various | Various : Various | 0.000 | 0.000 | | 0.123 | Oct 2022 | 0.125 | Oct 2023 | - | | 0.125 | 0.000 | 0.248 | - |
| | | **Subtotal** | 0.725 | 0.068 | | 0.187 | | 0.185 | | - | | 0.185 | Continuing | Continuing | N/A |

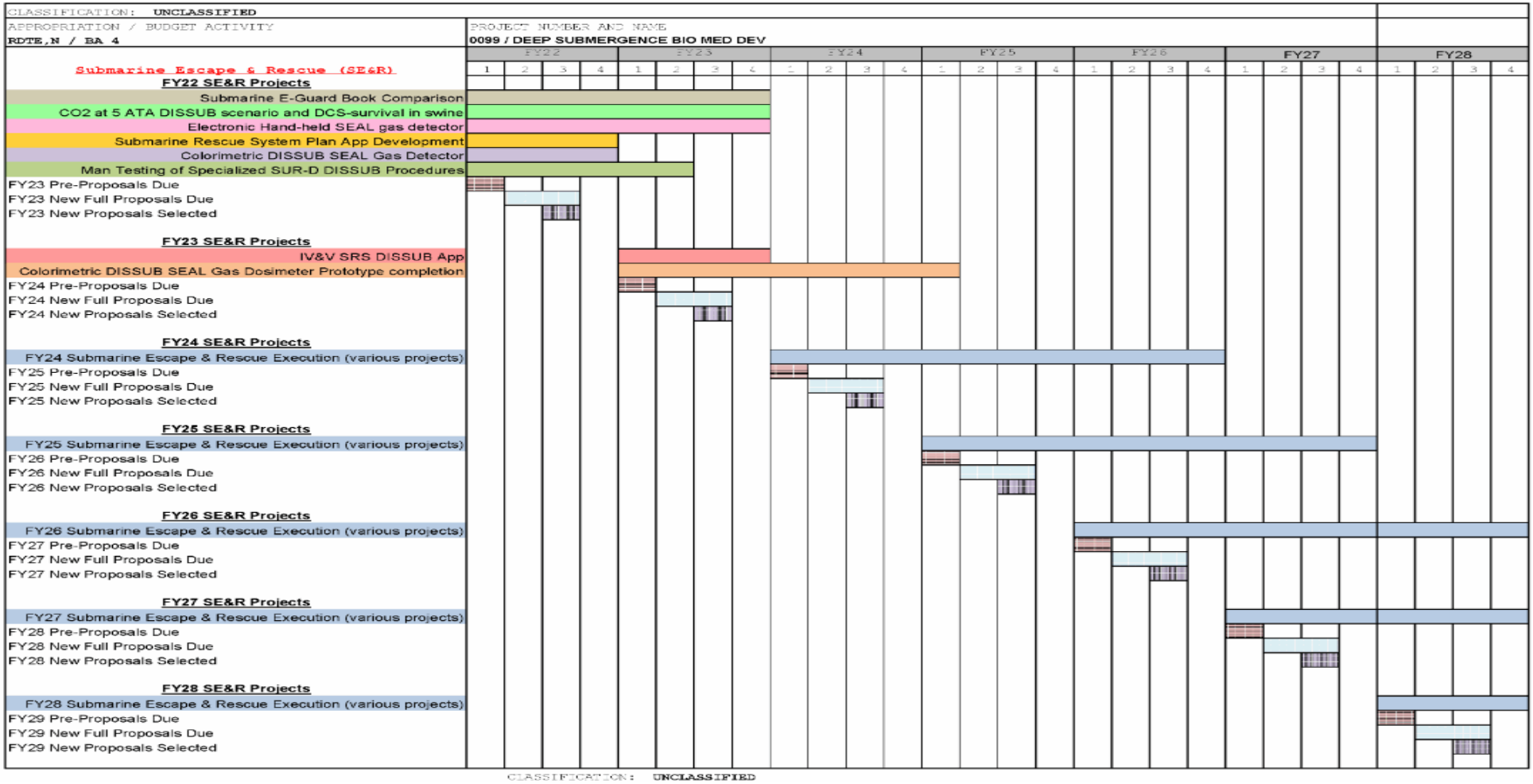
| | Prior Years | FY 2022 | | FY 2023 | | FY 2024 Base | | FY 2024 OCO | | FY 2024 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 49.227 | 4.354 | | 3.082 | | 2.433 | | - | | 2.433 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0099*** | | | | |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Underwater Noise Dosimeter | 1 | 2022 | 4 | 2024 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: CNS O2 Tox Mitigation with Ketone Supplement | 1 | 2022 | 4 | 2023 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Ultrahigh Frequency Perception in Divers | 1 | 2022 | 4 | 2023 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Probabilistic DCS Model Development | 1 | 2022 | 4 | 2023 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: 21st Century Surface Supplied Heliox Tables Manned Testing | 1 | 2022 | 2 | 2023 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Rehydration Strategies for Post-Immersion Performance | 1 | 2022 | 4 | 2022 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: LADS Human Factors Development | 1 | 2022 | 4 | 2022 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Diver Health and Epidemiology Project | 1 | 2022 | 1 | 2023 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Marine-Environment-Optimized Tech to Assess Biologic Threats | 1 | 2022 | 4 | 2022 |
| Diver Health & Safety (DH&S): FY22 DH&S Projects: Respiratory Muscle Training & CO2 Retention | 1 | 2022 | 4 | 2022 |
| Diver Health & Safety (DH&S): FY23 Pre-Proposals Due | 1 | 2022 | 1 | 2022 |
| Diver Health & Safety (DH&S): FY23 New Full Proposals Due | 2 | 2022 | 3 | 2022 |
| Diver Health & Safety (DH&S): FY23 New Proposals Selected | 3 | 2022 | 3 | 2022 |
| Diver Health & Safety (DH&S): FY23 DH&S Projects: Swimming Induced Pulmonary Edema Delination in NSW | 1 | 2023 | 4 | 2024 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Diver Health & Safety (DH&S): FY23 DH&S Projects: Diver Health and Contaminated Water | 1 | 2023 | 4 | 2023 |
| Diver Health & Safety (DH&S): FY24 Pre-Proposals Due | 1 | 2023 | 1 | 2023 |
| Diver Health & Safety (DH&S): FY24 New Full Proposals Due | 2 | 2023 | 3 | 2023 |
| Diver Health & Safety (DH&S): FY24 New Proposals Selected | 3 | 2023 | 3 | 2023 |
| Diver Health & Safety (DH&S): FY24 DH&S Projects: FY24 Diver Health and Safety Execution (various projects) | 1 | 2024 | 4 | 2026 |
| Diver Health & Safety (DH&S): FY25 Pre-Proposals Due | 1 | 2024 | 1 | 2024 |
| Diver Health & Safety (DH&S): FY25 New Full Proposals Due | 2 | 2024 | 3 | 2024 |
| Diver Health & Safety (DH&S): FY25 New Proposals Selected | 3 | 2024 | 3 | 2024 |
| Diver Health & Safety (DH&S): FY25 DH&S Projects: FY25 Diver Health and Safety Execution (various projects) | 1 | 2025 | 4 | 2027 |
| Diver Health & Safety (DH&S): FY26 Pre-Proposals Due | 1 | 2025 | 1 | 2025 |
| Diver Health & Safety (DH&S): FY26 New Full Proposals Due | 2 | 2025 | 3 | 2025 |
| Diver Health & Safety (DH&S): FY26 New Proposals Selected | 3 | 2025 | 3 | 2025 |
| Diver Health & Safety (DH&S): FY26 DH&S Projects: FY26 Diver Health and Safety Execution (various projects) | 1 | 2026 | 4 | 2028 |
| Diver Health & Safety (DH&S): FY27 Pre-Proposals Due | 1 | 2026 | 1 | 2026 |
| Diver Health & Safety (DH&S): FY27 New Full Proposals Due | 2 | 2026 | 3 | 2026 |
| Diver Health & Safety (DH&S): FY27 New Proposals Selected | 3 | 2026 | 3 | 2026 |
| Diver Health & Safety (DH&S): FY27 DH&S Projects: FY27 Diver Health and Safety Execution (various projects) | 1 | 2027 | 4 | 2028 |
| Diver Health & Safety (DH&S): FY28 Pre-Proposals Due | 1 | 2027 | 1 | 2027 |
| Diver Health & Safety (DH&S): FY28 New Full Proposals Due | 2 | 2027 | 3 | 2027 |
| Diver Health & Safety (DH&S): FY28 New Proposals Selected | 3 | 2027 | 3 | 2027 |
| Diver Health & Safety (DH&S): FY28 DH&S Projects: FY28 Diver Health and Safety Execution (various projects) | 1 | 2028 | 4 | 2028 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Diver Health & Safety (DH&S): FY29 Pre-Proposals Due | 1 | 2028 | 1 | 2028 |
| Diver Health & Safety (DH&S): FY29 New Full Proposals Due | 2 | 2028 | 3 | 2028 |
| Diver Health & Safety (DH&S): FY29 New Proposals Selected | 3 | 2028 | 3 | 2028 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: Submarine E-Guard Book Comparison | 1 | 2022 | 4 | 2023 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: CO2 at 5 ATA DISSUB scenario and DCS-survival in swine | 1 | 2022 | 4 | 2023 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: Electronic Hand-held SEAL gas detector | 1 | 2022 | 4 | 2023 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: Submarine Rescue System Plan App Development | 1 | 2022 | 4 | 2022 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: Colorimetric DISSUB SEAL Gas Detector | 1 | 2022 | 4 | 2022 |
| Submarine Escape & Rescue (SE&R): FY22 SE&R Projects: Man Testing of Specialized SUR-D DISSUB Procedures | 1 | 2022 | 2 | 2023 |
| Submarine Escape & Rescue (SE&R): FY23 Pre-Proposals Due | 1 | 2022 | 1 | 2022 |
| Submarine Escape & Rescue (SE&R): FY23 New Full Proposals Due | 2 | 2022 | 3 | 2022 |
| Submarine Escape & Rescue (SE&R): FY23 New Proposals Selected | 3 | 2022 | 3 | 2022 |
| Submarine Escape & Rescue (SE&R): FY23 SE&R Projects: IV&V SRS DISSUB App | 1 | 2023 | 4 | 2023 |
| Submarine Escape & Rescue (SE&R): FY23 SE&R Projects: Colorimetric DISSUB SEAL Gas Dosimeter Prototype completion | 1 | 2023 | 1 | 2025 |
| Submarine Escape & Rescue (SE&R): FY24 Pre-Proposals Due | 1 | 2023 | 1 | 2023 |
| Submarine Escape & Rescue (SE&R): FY24 New Full Proposals Due | 2 | 2023 | 3 | 2023 |
| Submarine Escape & Rescue (SE&R): FY24 New Proposals Selected | 3 | 2023 | 3 | 2023 |
| Submarine Escape & Rescue (SE&R): FY24 SE&R Projects: FY24 Submarine Escape & Rescue Execution (various projects) | 1 | 2024 | 4 | 2026 |
| Submarine Escape & Rescue (SE&R): FY25 Pre-Proposals Due | 1 | 2024 | 1 | 2024 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Submarine Escape & Rescue (SE&R): FY25 New Full Proposals Due | 2 | 2024 | 3 | 2024 |
| Submarine Escape & Rescue (SE&R): FY25 New Proposals Selected | 3 | 2024 | 3 | 2024 |
| Submarine Escape & Rescue (SE&R): FY25 SE&R Projects: FY25 Submarine Escape & Rescue Execution (various projects) | 1 | 2025 | 4 | 2027 |
| Submarine Escape & Rescue (SE&R): FY26 Pre-Proposals Due | 1 | 2025 | 1 | 2025 |
| Submarine Escape & Rescue (SE&R): FY26 New Full Proposals Due | 2 | 2025 | 3 | 2025 |
| Submarine Escape & Rescue (SE&R): FY26 New Proposals Selected | 3 | 2025 | 3 | 2025 |
| Submarine Escape & Rescue (SE&R): FY26 SE&R Projects: FY26 Submarine Escape & Rescue Execution (various projects) | 1 | 2026 | 4 | 2028 |
| Submarine Escape & Rescue (SE&R): FY27 Pre-Proposals Due | 1 | 2026 | 1 | 2026 |
| Submarine Escape & Rescue (SE&R): FY27 New Full Proposals Due | 2 | 2026 | 3 | 2026 |
| Submarine Escape & Rescue (SE&R): FY27 New Proposals Selected | 3 | 2026 | 3 | 2026 |
| Submarine Escape & Rescue (SE&R): FY27 SE&R Projects: FY27 Submarine Escape & Rescue Execution (various projects) | 1 | 2027 | 4 | 2028 |
| Submarine Escape & Rescue (SE&R): FY28 Pre-Proposals Due | 1 | 2027 | 1 | 2027 |
| Submarine Escape & Rescue (SE&R): FY28 New Full Proposals Due | 2 | 2027 | 3 | 2027 |
| Submarine Escape & Rescue (SE&R): FY28 New Proposals Selected | 3 | 2027 | 3 | 2027 |
| Submarine Escape & Rescue (SE&R): FY28 SE&R Projects: FY28 Submarine Escape & Rescue Execution (various projects) | 1 | 2028 | 4 | 2028 |
| Submarine Escape & Rescue (SE&R): FY29 Pre-Proposals Due | 1 | 2028 | 1 | 2028 |
| Submarine Escape & Rescue (SE&R): FY29 New Full Proposals Due | 2 | 2028 | 3 | 2028 |
| Submarine Escape & Rescue (SE&R): FY29 New Proposals Selected | 3 | 2028 | 3 | 2028 |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | | Date: March 2023 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0394 / *Shallow Depth Diving EQ* | |

| COST ($ in Millions) | Prior Years | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total | FY 2025 | FY 2026 | FY 2027 | FY 2028 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0394: *Shallow Depth Diving EQ* | 33.223 | 4.193 | 3.111 | 8.318 | - | 8.318 | 13.215 | 7.074 | 6.098 | 5.395 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project develops 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. R&D will be performed in the areas of diver tools to improve work efficiency, tracking and navigation, visual enhancement, contaminated water diving, diver environmental protection, and recompression chamber technology.

This project develops systems to support Naval Expeditionary Combat Command Diving. Operations include salvage/recover and underwater construction 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. R&D will be performed in the areas of diver tools to improve work efficiency, tracking and navigation, visual enhancement, contaminated water diving, diver environmental protection and recompression chamber technology.

Requirements:
Operational Requirements Document, Revision 2 for Submarine Rescue Diving and Recompression System (SRDRS) Serial 694-87-06 dtd 6 June 2006
COMSUBLANT/COMSUBPAC OPORD 2137 (Submarine Rescue) dtd 5 Aug 2014
Mission Needs Statement, M016402-92
Survivability, OPNAV N87 ltr Serial N87/5U659719 dtd 30 Jan 1995

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| ***Title:*** Shallow Depth Diving EQ - Diving (N97) | 1.624 | 1.077 | 1.975 | 0.000 | 1.975 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Continued research into all engineering and equipment design aspects of manned diving, to include: life support, contaminated water, SCUBA, gas analysis, thermal protection, saturation diving, and divers tools. | | | | | |
| ***FY 2023 Plans:***<br>* DAVD System Improvement: Start work on developing a self contained DAVD that does not rely on surface umbilicals or fixed sonar installations. This will allow HUD systems and onboard spatial awareness without the requirement to be tethered to the surface. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| * Authorized for Navy Use (ANU) Item Testing / Retesting: Testing of life support and other underwater systems for inclusion on the ANU list. This will include both testing of existing ANU items to ensure continued compliance with configuration management and quality or the testing of new items that are desired by fleet divers.<br><br>* Deep Sea Expeditionary No "D" (DSEND) Suit: Develop and test a 30 fsw form-fitting 1ATA suit prototype and commence development of a 300 fsw suit based on successful demonstration of the 30 fsw prototype. This will allow Navy divers to work at significant depths in a self-propelled, flexible suit without the need to perform lengthy decompression or be at risk for decompression sickness.<br><br>* Contaminated Environment Equipment Testing: Conduct testing on diver protective equipment for limited contaminated water environments. This equipment will allow divers to safely enter contaminated environments to conduct necessary salvage operations. | | | | | |
| ***FY 2024 Base Plans:***<br>* Deep Sea Expeditionary No "D" (DSEND) Suit: Develop and test a 30 fsw form-fitting 1ATA suit prototype and commence development of a 300 fsw suit based on successful demonstration of the 30 fsw prototype. This will allow Navy divers to work at significant depths in a self-propelled, flexible suit without the need to perform lengthy decompression or be at risk for decompression sickness.<br><br>* Transportable Recompression Chamber System (TRCS)/Standard Navy Double Lock (SNDL) Recompression Chamber/Flyaway Dive System (FADS)/etc. Lifespan Evaluation: High value infrastructure diving equipment has been serving in the fleet for two decades or more. This work will be to conduct a Fitness-for-Service evaluation of the subject equipment to understand material condition and inform decision to overhaul or replace subject equipment.<br><br>* Air Sensor Development and Testing: Start development of sensors to analyze for CO2, oil and particulates in chambers and diver life support systems. These sensors will allow divers to maintain and monitor air purity in breathing gases. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| * ANU Item Testing / Retesting: Testing of life support and other underwater systems for inclusion on the ANU list. This will include both testing of existing ANU items to ensure continued compliance with configuration management and quality or the testing of new items that are desired by fleet divers.<br>***FY 2024 OCO Plans:***<br>N/A<br>***FY 2023 to FY 2024 Increase/Decrease Statement:***<br>An increase of +$0.898M in FY24 is to enable the start of equipment life extension analyses and contaminated environment equipment development. | | | | | |
| ***Title:*** Shallow Depth Diving EQ - Submarine Escape and Rescue | 2.569 | 2.034 | 5.073 | 0.000 | 5.073 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Research, development, testing, design, procurement and installation of technologies to support improvements, increase resiliency, and increase capabilities of equipment, processes and procedures required to ensure successful escape and rescue of Distressed Submarine (DISSUB) survivors and to allow for a minimum 15 year system service life extension. The ability to ensure successful escape and rescue is a core function of the Undersea Warfare enterprise. | | | | | |
| ***FY 2023 Plans:***<br>Complete examination of a material solution to achieve service life extension for the submarine rescue system as needed prior to end of existing Submarine Rescue System (SRS) end of life. Conduct engineering and alternatives investigation for materiel solutions that addresses the documented capability gaps for the SRS impacting sustainability and reliability. This effort will develop and outline system level design needs that addresses upgrades for obsolescence and resiliency, as well as comparing upgrades to replacement options for the system. It also develops solutions to reduce reliance on single-source foreign suppliers addressing current critical requirements gaps. Includes Engineering evaluation of system capability increases to include, but not limited to: Micro-electronics System Upgrades, Electro-Optics for Launch and Recovery System (LARS) to address current Sea State Limitations and provide real-time diagnostics for LARS loads and accelerations, Atmospheric Sensing and Scrubbing to reduce current operational and maintenance requirements by replacing obsolete Analox Units and hand-pumps used, Through-hull communications to provide end-to-end DISSUB communications system that provides increased capabilities by allowing rescue from an unresponsive submarine. | | | | | |
| ***FY 2024 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| Begin development, test, design and procurement of critical technologies necessary to support a planned minimum 15 year system service life extension as part of the Submarine Rescue System (SRS) Modernization program. Many SRS subsystems and components necessary to meet mission requirements have known capability gaps, are obsolete, result in higher than sustainable maintenance costs and higher than acceptable risks. Program is intended to proactively address system deficiencies and upgrade many system subcomponents to a System of System's approach to ensure adequate technology margins are, and will remain, available. Planned upgrades include, but are not limited to, Micro-electronics System Upgrades, Electro-Optics for Launch and Recovery System (LARS) to address current Sea State Limitations and provide real-time diagnostics for LARS loads and accelerations, Atmospheric Sensing and Scrubbing to reduce current operational and maintenance requirements by replacing obsolete Analox Units and hand-pumps used, Through-hull communications to provide end-to-end DISSUB communications system that provides increased capabilities by allowing rescue from an unresponsive submarine.<br>***FY 2024 OCO Plans:***<br>N/A<br>***FY 2023 to FY 2024 Increase/Decrease Statement:***<br>FY2024 increase of +$3.039M is required by the Navy in order to provide a credible U.S. Submarine Rescue System (SRS) for our sailors and ally partner nations. As part of detailed review, Navy determined the system had not been funded sufficiently to properly modernize the system and FY24 budget increase is to support this. The modernization of SRS is required to address known reliability and obsolescence issues and support the planned minimum 15 year system service life extension prior to SRS's end of life and inoperability. | | | | | |
| ***Title:*** Shallow Depth Diving EQ - Diving (N95)<br>***Articles:***<br>***Description:*** Research into all engineering and equipment design aspects of manned diving, to include: life support, contaminated water, self contained underwater breathing apparatus (SCUBA), gas analysis, thermal protection, saturation diving, mixed gas diving, and divers tools.<br>***FY 2023 Plans:***<br>N/A<br>***FY 2024 Base Plans:***<br>Fly Away Mixed Gas (FMGS) System Refresh: At NECC request, develop and test an improved FMGS to reduce the size of the console and add an in-line semi closed rebreather system. The changes will improve | 0.000<br>- | 0.000<br>- | 1.270<br>- | 0.000<br>- | 1.270<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total |
|---|---|---|---|---|---|
| transportability, significantly reduce gas (HeO2) usage, and increase the time available when switching to the emergency gas supply (EGS) and are designed to significantly reduce safety hazards to the divers.<br>***FY 2024 OCO Plans:***<br>N/A<br>***FY 2023 to FY 2024 Increase/Decrease Statement:***<br>An increase of +$1.27M in FY24 enables the start of the FMGS refresh design, development and testing requested by the combatant commander, NECC. While increasing the U.S. Navy undersea search and salvage capability between 150-300 FSW, this RDT&E is required to fund equipment design and provide a prototype set of equipment for follow-on testing and evaluation. In addition to increasing mission capability, this system will increase the EGS gas availability by approximately 30 minutes and reduce HeO2 usage by up to 80%. Both these improvements will reduce the operational risks to the divers and provide a financial return on investment. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.193 | 3.111 | 8.318 | 0.000 | 8.318 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2022 | FY 2023 | FY 2024 Base | FY 2024 OCO | FY 2024 Total | FY 2025 | FY 2026 | FY 2027 | FY 2028 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/0955: *Deep Subm Sys Proj (DSSP) Equip* | 3.282 | 3.660 | 4.623 | - | 4.623 | 4.589 | 5.876 | 7.198 | 5.944 | Continuing | Continuing |
| • OPN/1130: *Diving and Salvage Equipment* | 10.772 | 11.773 | 18.086 | - | 18.086 | 17.499 | 17.877 | 14.716 | 13.043 | 0.000 | 171.772 |

**Remarks**

**D. Acquisition Strategy**

Diving Program acquisitions are executed and managed by SEA00C. Acquisitions are made for both COTS and developmental items as required to ensure adequate operational availability and safety of the diver. R&D projects are selected in March for a November award using a Broad Area Announcement.
Submarine Rescue Systems - SBIR contract is in place to support development and design.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy | | | Date: March 2023 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0394 / *Shallow Depth Diving EQ* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering - Design, Test, Integration (PMS-390) | C/CPFF | Oceaneering : Hanover, MD | 26.981 | 0.658 | Jan 2022 | 0.000 | | 0.300 | Oct 2023 | - | | 0.300 | 0.000 | 27.939 | - |
| Systems Engineering - Design, Integration (PMS-390) | WR | NUWC : Newport, RI | 0.399 | 0.052 | Nov 2021 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.451 | - |
| Systems Engineering - Design, Test, Integration (PMS-390) | WR | PNSY : Portsmouth, NH | 0.250 | 0.300 | Oct 2021 | 0.454 | Oct 2022 | 0.373 | Oct 2023 | - | | 0.373 | 0.000 | 1.377 | - |
| Diving Equipment Product Development (00C) | C/CPFF | Phoenix : Largo, MD | 0.885 | 0.477 | Oct 2021 | 0.350 | Oct 2022 | 0.550 | Oct 2023 | - | | 0.550 | 0.000 | 2.262 | - |
| Diving Equipment Product Development (00C) | C/FFP | Coda Octopus : Orlando, FL | 0.000 | 0.119 | Jul 2022 | 0.120 | Oct 2022 | 0.100 | Oct 2023 | - | | 0.100 | Continuing | Continuing | Continuing |
| Diving Equipment Product Development (00C) | C/CPFF | PCCI : Alexandria, VA | 2.251 | 0.000 | | 0.000 | | 0.200 | Oct 2023 | - | | 0.200 | 0.000 | 2.451 | - |
| Diving Equipment Product Development (00C) | WR | NSWC-PC : Panama City, FL | 0.807 | 0.240 | Mar 2022 | 0.240 | Oct 2022 | 0.280 | Oct 2023 | - | | 0.280 | Continuing | Continuing | Continuing |
| Diving Equipment Product Development (00C) | C/CPFF | GPC : Irvine, CA | 0.437 | 0.170 | Jan 2022 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.607 | - |
| Diving Equipment Product Development (00C) | TBD | Polestar : Needham Heights, MA | 0.000 | 0.000 | | 0.000 | | 0.180 | Oct 2023 | - | | 0.180 | 0.000 | 0.180 | - |
| Systems Engineering - Design, Test, Integration (PMS-390) | C/CPFF | Penn state UARC : Penn State, PA | 0.214 | 1.231 | Nov 2021 | 0.000 | | 3.000 | Nov 2023 | - | | 3.000 | 0.000 | 4.445 | - |
| Systems Engineering - Design, Integration (PMS-390) | C/CPFF | JHU : Baltimore, MD | 0.000 | 0.328 | Dec 2021 | 1.580 | Jan 2023 | 0.000 | | - | | 0.000 | 0.000 | 1.908 | - |
| Diving Equipment Product Development (00C) | WR | NEDU : Panama City, FL | 0.139 | 0.368 | Dec 2021 | 0.274 | Oct 2023 | 0.386 | Oct 2023 | - | | 0.386 | 0.000 | 1.167 | - |
| Systems Engineering - Design, Integration (00C for PMS-390) | C/CPFF | ACI Technologies, Inc : Philadelphia, PA | 0.115 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.115 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy | | | Date: March 2023 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0394 / *Shallow Depth Diving EQ* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diving Equipment Product Development (00C) | WR | NAVFAC EXWC : Port Hueneme, CA | 0.000 | 0.250 | Oct 2021 | 0.000 | | 0.150 | Oct 2023 | - | | 0.150 | 0.000 | 0.400 | - |
| Diving Equipment Product Development (00C N95) | TBD | James Fischer Defence : Aberdeen : Aberdeen, Scotland | 0.000 | 0.000 | | 0.000 | | 1.270 | Oct 2023 | - | | 1.270 | 0.000 | 1.270 | - |
| Systems Engineering - Design, Test, Integration (PMS-390) | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.400 | Jan 2024 | - | | 1.400 | 0.000 | 1.400 | - |
| | | **Subtotal** | 32.478 | 4.193 | | 3.018 | | 8.189 | | - | | 8.189 | Continuing | Continuing | N/A |

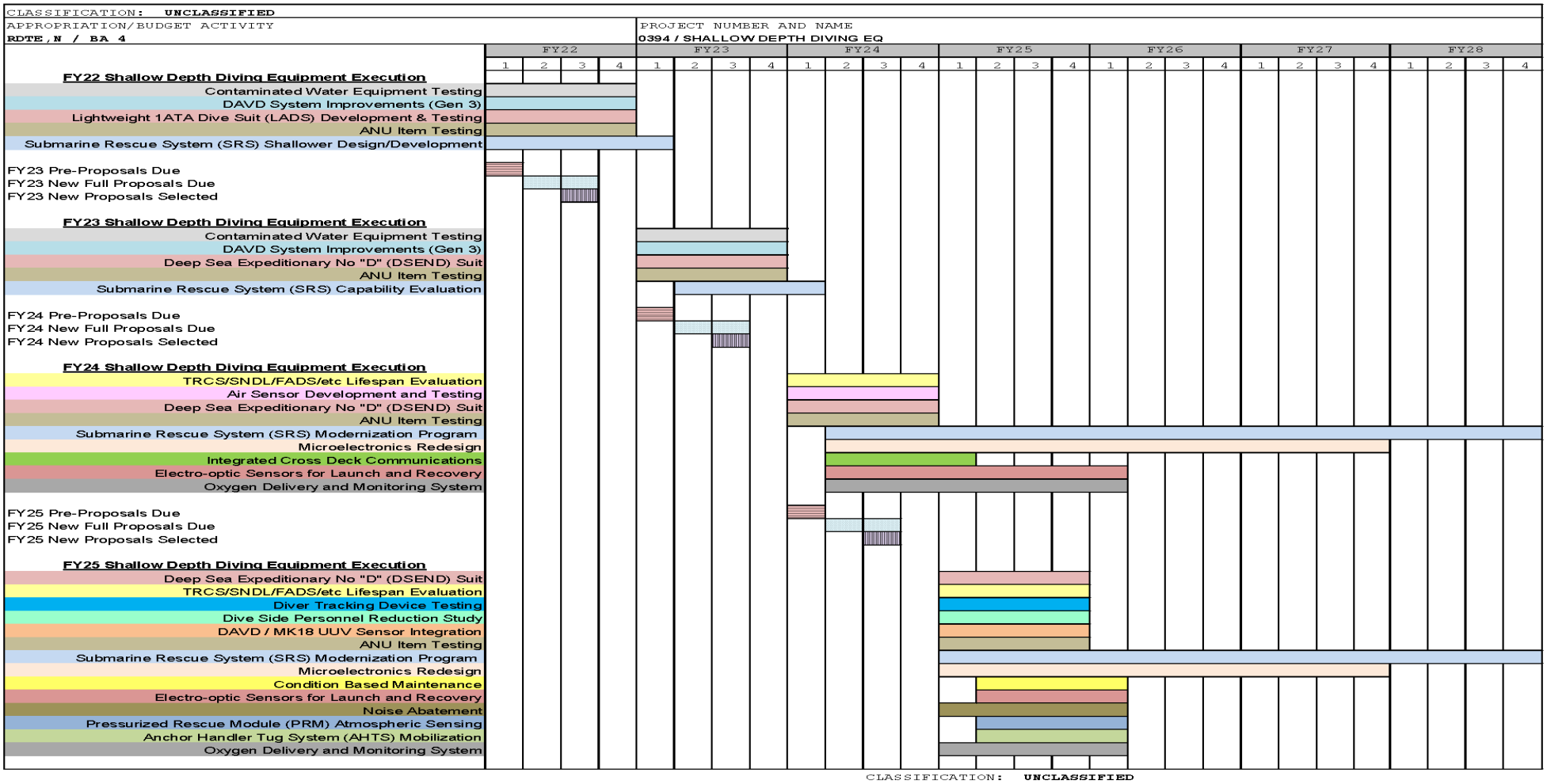
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel (00C) | Various | NAVSEA : Washington, DC | 0.159 | 0.000 | Oct 2021 | 0.020 | Oct 2022 | 0.020 | Oct 2023 | - | | 0.020 | Continuing | Continuing | Continuing |
| SBIR Assessment | Various | Various : Various | 0.513 | 0.000 | Oct 2021 | 0.043 | Oct 2022 | 0.079 | Oct 2023 | - | | 0.079 | 0.000 | 0.635 | - |
| Program Management Support (00C) | C/CPFF | Unknown : Not Specified | 0.073 | 0.000 | | 0.030 | Oct 2022 | 0.030 | Oct 2023 | - | | 0.030 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.745 | 0.000 | | 0.093 | | 0.129 | | - | | 0.129 | Continuing | Continuing | N/A |

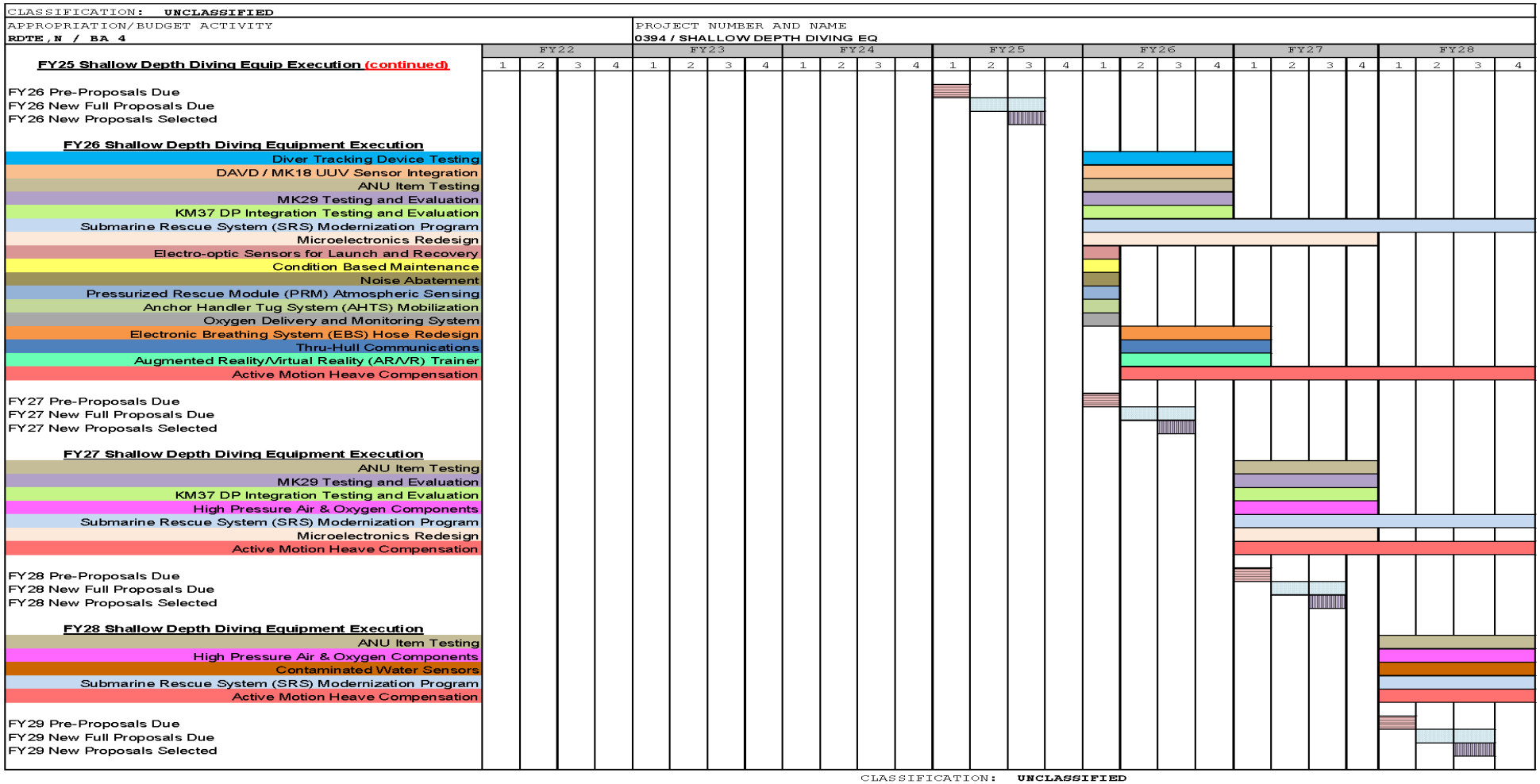
| | Prior Years | FY 2022 Cost | FY 2022 Award Date | FY 2023 Cost | FY 2023 Award Date | FY 2024 Base Cost | FY 2024 Base Award Date | FY 2024 OCO Cost | FY 2024 OCO Award Date | FY 2024 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 33.223 | 4.193 | | 3.111 | | 8.318 | | - | | 8.318 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0394*** | | | | |
| FY22 Shallow Depth Diving Equipment Execution: Contaminated Water Equipment Testing | 1 | 2022 | 4 | 2022 |
| FY22 Shallow Depth Diving Equipment Execution: DAVD System Improvements (Gen 3) | 1 | 2022 | 4 | 2022 |
| FY22 Shallow Depth Diving Equipment Execution: Lightweight 1ATA Dive Suit (LADS) Development & Testing | 1 | 2022 | 4 | 2022 |
| FY22 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2022 | 4 | 2022 |
| FY22 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Shallower Design/Development | 1 | 2022 | 1 | 2023 |
| FY23 Pre-Proposals Due | 1 | 2022 | 1 | 2022 |
| FY23 New Full Proposals Due | 2 | 2022 | 3 | 2022 |
| FY23 New Proposals Selected | 3 | 2022 | 3 | 2022 |
| 'FY23 Shallow Depth Diving Equipment Execution: Contaminated Water Equipment TestingDetail | 1 | 2023 | 4 | 2023 |
| 'FY23 Shallow Depth Diving Equipment Execution: DAVD System Improvements (Gen 3) | 1 | 2023 | 4 | 2023 |
| 'FY23 Shallow Depth Diving Equipment Execution: Deep Sea Expeditionary No "D" (DSEND) Suit | 1 | 2023 | 4 | 2023 |
| 'FY23 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2023 | 4 | 2023 |
| 'FY23 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Capability Evaluation | 2 | 2023 | 1 | 2024 |
| FY24 Pre-Proposals Due | 1 | 2023 | 1 | 2023 |
| FY24 New Full Proposals Due | 2 | 2023 | 3 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| FY24 New Proposals Selected | 3 | 2023 | 3 | 2023 |
| 'FY24 Shallow Depth Diving Equipment Execution: TRCS/SNDL/FADS/etc Lifespan Evaluation | 1 | 2024 | 4 | 2024 |
| 'FY24 Shallow Depth Diving Equipment Execution: Air Sensor Development and Testing | 1 | 2024 | 4 | 2024 |
| 'FY24 Shallow Depth Diving Equipment Execution: Deep Sea Expeditionary No "D" (DSEND) Suit | 1 | 2024 | 4 | 2024 |
| 'FY24 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2024 | 4 | 2024 |
| 'FY24 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Modernization Program | 2 | 2024 | 4 | 2028 |
| 'FY24 Shallow Depth Diving Equipment Execution: Microelectronics Redesign | 2 | 2024 | 4 | 2027 |
| 'FY24 Shallow Depth Diving Equipment Execution: Integrated Cross Deck Communications | 2 | 2024 | 1 | 2025 |
| 'FY24 Shallow Depth Diving Equipment Execution: Electro-optic Sensors for Launch and Recovery | 2 | 2024 | 1 | 2026 |
| 'FY24 Shallow Depth Diving Equipment Execution: Oxygen Delivery and Monitoring System | 2 | 2024 | 1 | 2026 |
| FY25 Pre-Proposals Due | 1 | 2024 | 1 | 2024 |
| FY25 New Full Proposals Due | 2 | 2024 | 3 | 2024 |
| FY25 New Proposals Selected | 3 | 2024 | 3 | 2024 |
| 'FY25 Shallow Depth Diving Equipment Execution: Deep Sea Expeditionary No "D" (DSEND) Suit | 1 | 2025 | 4 | 2025 |
| 'FY25 Shallow Depth Diving Equipment Execution: TRCS/SNDL/FADS/etc Lifespan Evaluation | 1 | 2025 | 4 | 2025 |
| 'FY25 Shallow Depth Diving Equipment Execution: Diver Tracking Device Testing | 1 | 2025 | 4 | 2025 |
| 'FY25 Shallow Depth Diving Equipment Execution: Dive Side Personnel Reduction Study | 1 | 2025 | 4 | 2025 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| 'FY25 Shallow Depth Diving Equipment Execution: DAVD / MK18 UUV Sensor Integration | 1 | 2025 | 4 | 2025 |
| 'FY25 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2025 | 4 | 2025 |
| 'FY25 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Modernization Program | 1 | 2025 | 4 | 2028 |
| 'FY25 Shallow Depth Diving Equipment Execution: Microelectronics Redesign | 1 | 2025 | 4 | 2027 |
| 'FY25 Shallow Depth Diving Equipment Execution: Condition Based Maintenance | 2 | 2025 | 1 | 2026 |
| 'FY25 Shallow Depth Diving Equipment Execution: Electro-optic Sensors for Launch and Recovery | 2 | 2025 | 1 | 2026 |
| 'FY25 Shallow Depth Diving Equipment Execution: Noise Abatement | 1 | 2025 | 1 | 2026 |
| 'FY25 Shallow Depth Diving Equipment Execution: Pressurized Rescue Module (PRM) Atmospheric Sensing | 2 | 2025 | 1 | 2026 |
| 'FY25 Shallow Depth Diving Equipment Execution: Anchor Handler Tug System (AHTS) Mobilization | 2 | 2025 | 1 | 2026 |
| 'FY25 Shallow Depth Diving Equipment Execution: Oxygen Delivery and Monitoring System | 1 | 2025 | 1 | 2026 |
| FY26 Pre-Proposals Due | 1 | 2025 | 1 | 2025 |
| FY26 New Full Proposals Due | 2 | 2025 | 3 | 2025 |
| FY26 New Proposals Selected | 3 | 2025 | 3 | 2025 |
| 'FY26 Shallow Depth Diving Equipment Execution: Diver Tracking Device Testing | 1 | 2026 | 4 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: DAVD / MK18 UUV Sensor Integration | 1 | 2026 | 4 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2026 | 4 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: MK29 Testing and Evaluation | 1 | 2026 | 4 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: KM37 DP Integration Testing and Evaluation | 1 | 2026 | 4 | 2026 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| 'FY26 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Modernization Program | 1 | 2026 | 4 | 2028 |
| 'FY26 Shallow Depth Diving Equipment Execution: Microelectronics Redesign | 1 | 2026 | 4 | 2027 |
| 'FY26 Shallow Depth Diving Equipment Execution: Electro-optic Sensors for Launch and Recovery | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Condition Based Maintenance | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Noise Abatement | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Pressurized Rescue Module (PRM) Atmospheric Sensing | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Anchor Handler Tug System (AHTS) Mobilization | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Oxygen Delivery and Monitoring System | 1 | 2026 | 1 | 2026 |
| 'FY26 Shallow Depth Diving Equipment Execution: Electronic Breathing System (EBS) Hose Redesign | 2 | 2026 | 1 | 2027 |
| 'FY26 Shallow Depth Diving Equipment Execution: Thru-Hull Communications | 2 | 2026 | 1 | 2027 |
| 'FY26 Shallow Depth Diving Equipment Execution: Augmented Reality/Virtual Reality (AR/VR) Trainer | 2 | 2026 | 1 | 2027 |
| 'FY26 Shallow Depth Diving Equipment Execution: Active Motion Heave Compensation | 2 | 2026 | 4 | 2028 |
| FY27 Pre-Proposals Due | 1 | 2026 | 1 | 2026 |
| FY27 New Full Proposals Due | 2 | 2026 | 3 | 2026 |
| FY27 New Proposals Selected | 3 | 2026 | 3 | 2026 |
| FY27 Shallow Depth Diving Equipment Execution: ANU Item Testing | 1 | 2027 | 4 | 2027 |
| FY27 Shallow Depth Diving Equipment Execution: MK29 Testing and Evaluation | 1 | 2027 | 4 | 2027 |
| FY27 Shallow Depth Diving Equipment Execution: KM37 DP Integration Testing and Evaluation | 1 | 2027 | 4 | 2027 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy | | Date: March 2023 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| FY27 Shallow Depth Diving Equipment Execution: High Pressure Air & Oxygen Components | 1 | 2027 | 4 | 2027 |
| FY27 Shallow Depth Diving Equipment Execution: Submarine Rescue System (SRS) Modernization Program | 1 | 2027 | 4 | 2028 |
| FY27 Shallow Depth Diving Equipment Execution: Microelectronics Redesign | 1 | 2027 | 4 | 2027 |
| FY27 Shallow Depth Diving Equipment Execution: Active Motion Heave Compensation | 1 | 2027 | 4 | 2028 |
| FY28 Pre-Proposals Due | 1 | 2027 | 1 | 2027 |
| FY28 New Full Proposals Due | 2 | 2027 | 3 | 2027 |
| FY28 New Proposals Selected | 3 | 2027 | 3 | 2027 |
| FY28 Shallow Depth diving Equipment Execution: ANU Item Testing | 1 | 2028 | 4 | 2028 |
| FY28 Shallow Depth diving Equipment Execution: High Pressure Air & Oxygen Components | 1 | 2028 | 4 | 2028 |
| FY28 Shallow Depth diving Equipment Execution: Contaminated Water Sensors | 1 | 2028 | 4 | 2028 |
| FY28 Shallow Depth diving Equipment Execution: Submarine Rescue System (SRS) Modernization Program | 1 | 2028 | 4 | 2028 |
| FY28 Shallow Depth diving Equipment Execution: Active Motion Heave Compensation | 1 | 2028 | 4 | 2028 |
| FY29 Pre-Proposals Due | 1 | 2028 | 1 | 2028 |
| FY29 New Full Proposals Due | 2 | 2028 | 3 | 2028 |
| FY29 New Proposals Selected | 3 | 2028 | 3 | 2028 |