Consolidation of the Department of Defense Contract Administration Services Business Case Analysis

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(Acquisition Reform)

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Executive Summary

This report presents the results of a study for the Office of the Deputy Under Secretary of Defense (Acquisition Reform) concerning post-award contract administration in selected components of the Department of Defense (DoD). In this study, the contract administration services (CAS) performed by the Navy Supervisor of Shipbuilding (SUPSHIP), the Office of Naval Research (ONR) and the Army Government Owned, Contractor Operated Ammunition Plants (AAPs) were analyzed for possible consolidation to the Defense Contract Management Command (DCMC).

This issue has been studied numerous times in the past, most recently by the DoD Inspector General in January 1998. Prior studies have focused on whether or not the functions *could* be transferred to DCMC. This study focuses on whether or not the functions *should* be transferred based on cost and other considerations. This study is a Business Case Analysis, where various alternative approaches, including the status quo, are compared to determine the best business decision for the Department of Defense.

The analysis relied on extensive data gathering and site visits to representative offices for all affected commands. Both initial "investment" costs and 10 years of operating and support costs were calculated for the status quo as well as a number of alternative operating scenarios at each organization. Importantly, qualitative factors such as impact on organizational mission, subject matter expertise of assigned staff and timeliness of services were analyzed as well. The recommendations for each organization are independent from the others and are based on the combined results of our quantitative and qualitative analysis.

It is important to note that this decision has the largest impact at SUPSHIP, where the number of affected personnel is significantly greater than the other two organizations. Figure ES-1 provides a summary of the effort currently involved in post award CAS at the study organizations.

Organization	Number of CAS Work Years
SUPSHIP	
Repair Facilities	406.5
New Construction	402.9
Total	809.4
ONR	76
Army Ammunition Plants	
Active	81.4
Inactive	4.9
Total	86.3

Figure ES-1 – Current CAS Effort

It is also important to note that unlike the organizations of the early 1990s, which were consolidated into DCMC, the organizations we studied herein have been subjected to downsizing over the last nine years and have achieved certain efficiencies already.

A final related area of our study was to address the impacts of eliminating DFARS 242.203(a)(i)(B), which authorizes DoD components to retain contract administration functions for research and development with universities.

Results

Figure ES-2 below provides a summary of our results for SUPSHIP. While numerous operating scenarios were considered, only one alternative to the status quo was studied. The other scenarios were determined to be infeasible in light of the shipbuilding environment.

	STATUS Quo	**Alternative S-1A**
SUPSHIP	Current Operations	Transition to DCMC (all CAS personnel remain on-site)
Cost (Discounted $M)		
Investment Cost	$0.00	$5.3M
10 Year O&S Cost	$446.3M	$543.7M
Total Cost (most likely)	$446.3M	$549.1M
Net qualitative Rating	0.757	0.243

Figure ES-2 – SUPSHIP Results

Figure ES-3 below provides a summary of our results for ONR. The analyzed alternative was the total transfer of all CAS from ONR to DCMC and physically consolidating personnel into the DCMC Contract Administration Offices (CAOs).

	STATUS Quo	**Alternative 0-1B**
ONR	Current Operations	Transition to DCMC (all CAS personnel move to DCMC CAO)
Cost (Discounted $M)		
Investment Cost	$0.00	$ 1.2M
10 Year O&S Cost	$43.0M	$42.5M
Total Cost (most likely)	$43.0M	$43.7M
Net qualitative Rating	0.714	0.286

Figure ES-3 – ONR Results

Figure ES-4 below provides a summary of our results for Army Ammunition Plants. In addition to the two operating scenarios associated with full transfer of CAS to DCMC, an additional alternative, Alternative 2, was analyzed in which only the CAS functions not needing to be performed on-site at the AAPs are transferred to DCMC. For this alternative, transferring personnel are physically consolidated into the DCMC CAOs.

	STATUS Quo A-SQ	Alternative A-1A	Alternative A-1B	Alternative A-2
AAP	Current Operations	Transition to DCMC (all CAS personnel remain at AAP)	Transition to DCMC (all CAS personnel move to DCMC CAO)	Partial transition to DCMC (transferred CAS personnel move to DCMC CAO)
Cost (Discounted $M)				
Investment Cost	$0.00	$1.2M	$1.2M	$1.2M
10 Year O&S Cost	$54.3M	$60.2M	$55.3M	$50.6M
Total Cost (most likely)	$54.3M	$61.4M	$56.5M	$51.7M
Net qualitative Rating	0.31	0.294	0.294	0.269

Figure ES-4 – Army Ammunition Plant Results

Regarding the issue of DFARS 242.203(a)(i)(B), study findings revealed that annually approximately $1 billion is contractually awarded to universities for research and development. The majority of these funds are awarded to ten universities, the Air Force and the Navy make the majority of the awards, and the majority of these contracts are administered by ONR. Study findings also revealed the following:

- The organizational affiliation of a contract administrator is of less importance than the individual's understanding of the university environment, cost and business practices,
- The physical location of the contract administrator is generally not a critical factor
- A contract administrator who acts as a single point of contact for all of a university's contracts is preferable to multiple contract administrators

Recommendations

Organizational change brings with it risks and often times, unforeseen problems. As a result, a change from the status quo needs to provide more than a marginal improvement in either cost or quality of service. One key assumption of this study was that any change from the status quo would need to be cost effective. While several of the above scenarios yield potential cost savings; in no case are the savings anything greater than marginal. In fact, the projected cost savings are within the range of expected cost-risk (as determined by risk analysis) in all cases. Given such minimal potential cost savings, a tangible improvement in the quality of services would need to be demonstrated to support a change from the status quo. However, the qualitative results suggest the status quo to be most favorable in all cases. As a result, we recommend that based on a Business Case Analysis, the status quo be maintained in all three organizations.

Key to making these types of business decisions is the quality of the data available for analysis. In most of our data gathering efforts for this study, critical metrics and historical impacts from past consolidations were not readily available. We recommend that, in the future, DoD

should develop and define meaningful CAS performance metrics to be implemented in all DoD components performing CAS. DCMC should take the lead among DoD CAS components by consolidating critical CAS metrics and promulgating the metrics across the CAS community and its customers. Meaningful metrics implemented across the DoD organizations would make quantitative and qualitative measures of changes to the status quo more exact.

One of the reasons for consolidation is to allow better sharing of techniques, successes, and "best practices" among professionals in a given community. While we recommend that a formal consolidation not be undertaken in these cases, we do recommend that DCMC lead regular DoD-wide sharing of approaches and success stories to continue to improve both the quality and cost effectiveness of the post-award CAS function across the enterprise.

Pending the outcome of an ongoing Government effort to collect data on the current assignments of CAS for university R&D contracts, it is recommended that DFARS 242.203 (a)(i)(B) be eliminated. A case-by-case determination of each of the major university-affiliated laboratories should be considered prior to requiring delegation of post-award CAS functions and determining the appropriate CAS component for each university. Additionally, a closer estimation of the potential volume of work, which may be redirected to any CAS provider, should be known to ensure that the recipient organization(s) is prepared for the additional volume of work.

1 Introduction

This report presents the results of a study for the Office of the Deputy Under Secretary of Defense (Acquisition Reform) (ODUSD (AR)) concerning post-award contract administration in selected components of the Department of Defense (DoD). Specifically, the study addressed whether to centralize post-award contract administration from selected DoD components to the Defense Contract Management Command (DCMC), a major element of the Defense Logistics Agency (DLA).

ODUSD (AR) retained Booz·Allen & Hamilton to conduct this study following a competitive contract award on November 25, 1998. This effort is the latest of a series of studies on this topic, most recent of which was conducted as an "evaluation" by the DoD Inspector General (IG). That effort (see "Consolidation of DoD Contract Administration Services," Report No. 98-604, January 15, 1998) recommended that the Undersecretary of Defense for Acquisition and Technology charter a joint executive level review of the cost effectiveness of consolidating contract administration. However, many of the reviewers of the IG's draft report did not accept the rationale given for consolidation on a number of grounds, including lack of sufficient/specific data to support that solution. As a result, an independent study was chartered. This report is the result of that effort.

Section 1.1 below describes the specific focus and scope of the study, while Section 1.2 outlines pertinent background on DCMC. The rationale for conducting a Business Case Analysis (BCA) and our methodology for doing so are presented in Sections 1.3 and 1.4 respectively. A complete discussion of each of studied organizations and the results of the BCA is contained in Sections 2 through 4. The final issue addressed in our study, regarding the retention of Defense Federal Acquisition Regulation Supplement (DFARS 242.203(a)(i)(B) is discussed in Section 5.

1.1 Statement of the Problem

"Post-award" contract administration, or "contract administration services" (CAS) refers to the functions performed by the Government after the award of a contract. The most prominent functions are carried out in such activities as:

- Processing payments
- Executing contract modifications
- Exercising quality control
- Monitoring schedule performance

In fact, the full list of CAS functions contained in the Federal Acquisition Regulation (FAR) suggests many more activities. The CAS Functions contained in the FAR and DFARS are provided in Appendix A.

CAS functions are exercised by the administrative contracting officer (ACO) and his/her representatives. The functions of the procuring contracting officer (PCO) are not within the scope of this study.

The study focused exclusively on shifts of CAS responsibilities in four settings, three of them defined by organization, the fourth by the use of research and development contracts with universities:

- Transfer of administration responsibility from the Naval Sea Systems Command (NAVSEA) Navy Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP) to DCMC
- Transfer of administration of grants and contracts with universities from the Office of Naval Research (ONR) to DCMC
- Transfer of contract administration responsibility from the Government-Owned, Contractor Operated (GOCO) Army ammunition plants to DCMC.
- Elimination of the DFARS provision 242.203(a)(i)(B) that authorizes components to retain contract administration functions for research and development with universities.

If made, these changes would eliminate most of the CAS responsibilities still outside the scope of DCMC operations, with a few notable exceptions, such as the US Army Corps of Engineers and the Naval Facilities Engineering Command.

The IG assessment cited above hinged most of its conclusions on assertions of greater efficiency of CAS when exercised in a consolidated manner. The consolidation alternative, as described by the IG report, achieves greater economies of scale in labor. However, no quantitative data were provided in the report to make that case or to support any other conclusion. A major intent of the present study is to provide some quantitative foundation for making conclusions about consolidation efficiency and other issues.

The IG report also referred to several qualitative issues, such as the added professionalism of CAS personnel that, the report asserted, could be achieved in a consolidated arrangement compared to the current decentralized mode in the organizations under study. The present study also addresses such qualitative factors and uses data and information from the affected organizations to reach conclusions.

Such qualitative issues heighten the focus on effectiveness versus efficiency issues. Effectiveness of CAS can be viewed, for example, in terms of the success of the overall process. In the SUPSHIP arena, for example, effective CAS contributes to the acquisition process delivering ships on time, according to specification, and with no undue contractor claims exposure to the Government. Effectiveness was not given extensive treatment in the IG report. The study team believes that the benefits of CAS effectiveness could easily dwarf the benefits of being more efficient in CAS, but recognizes the challenge of developing data to prove that case.

Section 1.4 of this report presents detail on the methodology used, including the criteria for evaluating the organizational alternatives.

1.2 Background and History of the CAS Consolidation Issue

Opportunities to improve CAS via consolidation have been asserted and studied for more than 20 years. In 1979, the Office of Dr. William Perry, then the Director of Defense Research and Engineering, undertook such a study that looked at the potential for consolidating the CAS for large platforms and weapons systems acquisitions in the Defense Contract Administration Service. The primary impetus was that the military services were not executing CAS well for each other, and that it needed to be moved to a “neutral corner” in a purple organization to be done most effectively.

In the ensuing 20 years, other studies have been performed, and consolidation has occurred in most large-scale cases. In the 1990s, besides the DoD IG study cited above, three other studies addressed the DoD components that are the focus of the current effort. However, none of these studies employed extensive analysis of cost data. These studies are summarized in the Figure 1-1 below.

STUDY	DATES	OBJECTIVE	RESULTS
Army Ammunition Plants (AAP)	1990	Determine exclusion of AAPs from consolidation with DCMC	The AAP CAS transfer would neither enhance readiness nor affect cost avoidance
Supervisor of Shipbuilding (SUPSHIP)	1990	Determine exclusion of SUPSHIP from consolidation with DCMC	The DEPSECDEF deferred decision based on: 1) Fifty percent or more of SUPSHIP functions were outside the mission of DCMC 2) Non-CAS functions were not readily severable from the SUPSHIP non-CAS functions 3) Transfer of SUPSHIP CAS to DCMC would probably increase staffing due to Navy's need to maintain an on-site presence
SUPSHIP	1993	Streamline Contract Management	The Under Secretary of Defense (Acquisition and Technology) recommended Navy retention of SUPSHIP CAS functions.

Figure 1-1 Previous DoD Studies

CAS consolidation, if effected for the organizations under study, would naturally take place in DCMC. DCMC was chartered in the Defense Management Review Decision (DMRD) 916 in 1989 and stood up the following year. The new organization was intended to both save money and increase CAS effectiveness by:

- Consolidating, streamlining, and achieving economies of scale
- Implementing uniform CAS policies and procedures and acting consistently by presenting a single face to industry
- Increasing the quality and professionalism of CAS personnel
- Reducing direct and overhead costs of CAS labor
- Preserving, for regulatory purposes, the division between ACO and PCO responsibilities

DCMC provides CAS to customers throughout DoD. For the current fiscal year, a projected 368,000 prime contracts will be administered, down about 20 percent since the start of the decade. Current contracts managed have an estimated obligation value of about $800 billion.

Like other components in the Department, DCMC has implemented significant restructuring, including changing the organizational structure and downsizing. Today, DCMC has just under 13,000 authorized positions/Full Time Equivalents (FTEs) and is on a trajectory to shed still more positions. Notably, the Command management attributes part of its ability to reduce staff and increase productivity to the increasing use of “risk management” in deploying CAS labor. Risk management approaches apply increasingly less labor to CAS workload based on

statistical sampling techniques, demonstrated satisfactory performance of suppliers, and information management support.

DCMC's mission is to provide customer focused contract management services -- throughout the acquisition life cycle. To accomplish its mission, DCMC performs a variety of functions, including:

- Providing contract management for diverse product lines among DoD services
- Performing price/cost analysis, overhead and contractor system reviews, financial services, property and plant clearance, transportation and packaging, and termination settlements
- Providing quality assurance by verifying contractor processes;
- Providing program and technical support by analyzing cost, schedule and technical performance of contractor programs and systems

DCMC's Contract Administration Offices (CAOs), located throughout the United States and the world, provide the following categories or types of post-contract award services to contracting officers and program managers:

- Provide support to fact-finding and negotiations
- Conduct safety and environmental assurance
- Conduct evaluations of contractor processes and controls
- Conduct evaluations of contractor corrective actions
- Provide control of property (such as facilities and Government furnished materials)
- Conduct independent evaluation of contractor progress to include progress payment evaluations

A complete list of CAS functions is provided as Appendix A.

DCMC's CAOs manage contracts within a geographic area and within contractors' plants. This management includes daily, on-site surveillance of contractor systems and program-specific concerns that cannot be viewed or monitored by offsite agencies, including access to and participation in internal contractor meetings. The CAO organization allows DCMC personnel to reside close to or in contractors' facilities and to tailor services to customers' unique requirements and associated risks.

Through the use of such modern techniques, DCMC is continuing the evolution begun nearly a decade ago to standardize and economize CAS processes. The consideration of transferring to DCMC some of the few remaining CAS operations not under its control is therefore readily understandable. In order to provide definitive recommendations about potential consolidations, the present study takes a business case approach, including a quantitative basis not previously undertaken.

1.3 Rationale for Conducting a Business Case

As discussed above, the issue of whether or not to centralize the post-award contract administration function has been studied numerous times. Based on previous studies as well as recent interviews with DCMC, DCMC is capable of accepting this function. Using this assumption, we focused on answering the question - *"Is it a good business decision to change where the function is being performed today?"*

When organizations need to make a complex business decision that includes multiple alternatives and numerous decision factors, a proven tool to support decision making is *Business Case Analysis*. Business Case Analysis is an extended form of Cost Benefit Analysis in which the alternatives' total costs for satisfying a business need are weighed against the alternatives' total benefits to determine the optimum solution. Business Case Analysis goes one step further than the Cost Benefit Analysis and links each alternative to mission performance and identifies which alternative will allow an organization to optimize mission performance given cost and other constraints. While dollar valued costs and benefits are important in the decision criteria, qualitative factors such as quality and timeliness are also directly included in decision making. The output of a Business Case is an analysis of all viable alternative business strategies along with recommendations for proceeding with the superior alternative.

1.4 Methodology

Our approach to a Business Case employs four major steps. After assessing the environment and collecting the data, alternatives are identified and analyzed. One alternative is then selected as the "preferred alternative" for resolving the problem. Figure 1-2 illustrates this methodology.

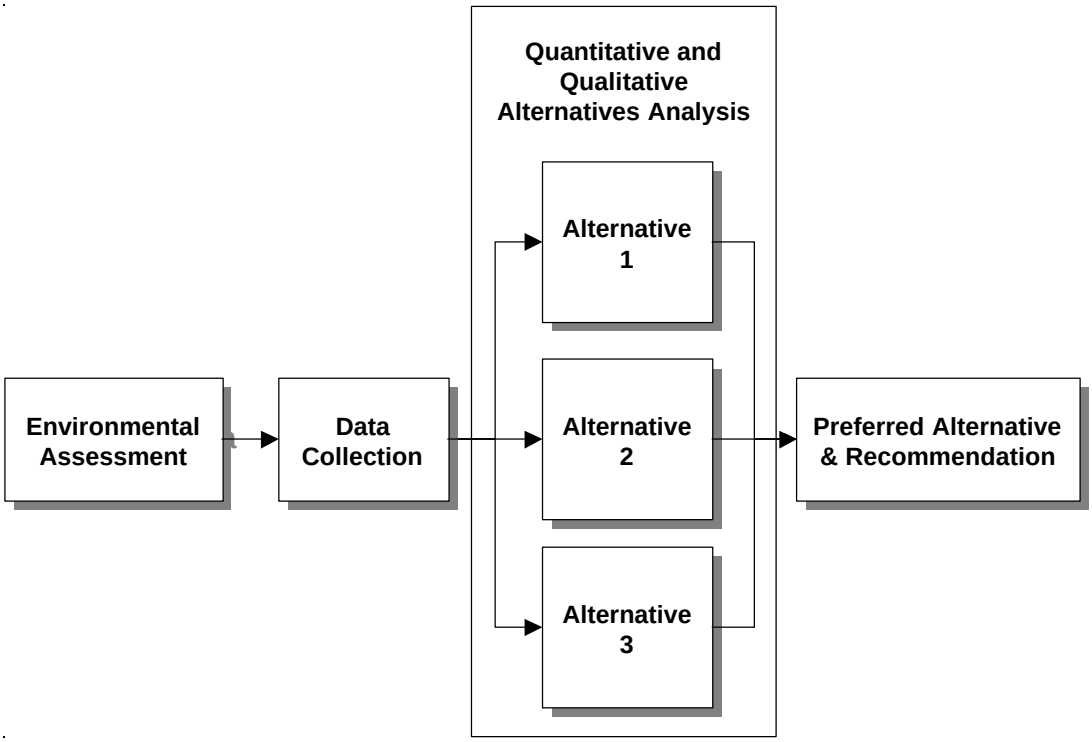


Figure 1-2 Business Case Methodology Model

1.4.1 Environmental Assessment

Development of this Business Case began with an *Environmental Assessment*. During this assessment we reviewed background documentation and interviewed key stakeholders as well as authors of the January 1998 DoD IG study. This helped us gain an understanding of the relevant issues, identify key mission performance factors (as well as how this function affects them), and

perform a limited performance gap analysis. The gap analysis identified any areas where the current organizational approach could be limiting the organization from meeting its mission. As part of the environmental assessment, we also developed a Cost Element Structure, a type of classification methodology. This structure is used later for collecting and/or estimating all costs. Lastly, we defined the factors used for comparing the alternatives qualitatively.

1.4.2 Data Collection

After we assessed the environment, we moved into the *Data Collection* stage. During this portion of the study, we reviewed in detail documentation from previous studies; collected data on staff (numbers, grades, and classifications) performing CAS functions throughout the target organizations; collected cost and budget data from the affected organizations to begin populating the cost model; and conducted numerous interviews with customers, performers and staff of the studied organizations. Additionally, we made site visits to selected SUPSHIP, ONR, and AAP locations to observe the operations and validate to the extent possible the hard copy data provided. A significant portion of this step was directed at defining and quantifying operations today, which represents our "status quo" alternative. This was a key step as all alternatives used the status quo as a baseline. We also met numerous times with DCMC to begin formulating transition requirements and alternative consolidation scenarios. A complete list of the sites visited, interviews and meetings conducted, and data collected is provided in Appendix B.

By explicit direction this study employed "currently available contract administration cost data associated with labor, other direct costs and overhead." We did not audit any of the cost or budget figures provided.

1.4.3 Alternatives Analysis

During the *Alternatives Analysis* stage, we developed cost estimates and performed a rigorous qualitative analysis for each alternative. The following sections describe the alternatives that we identified, as well as our approach to the quantitative and qualitative analyses.

1.4.3.1 Alternatives Definition

For each organization we defined the status quo as today's operations projected forward for ten years. Under the status quo, workload and staffing remains constant throughout the period. One alternative to the status quo is to transfer the entire function to DCMC. Within this alternative, there are two operational scenarios. In one, personnel remain in place at their current location. (We titled this alternative 1A.) In the other scenario, personnel are transferred to the nearest DCMC Contract Administration Office (CAO). (We titled this alternative 1B.) A second alternative considered represents the transfer of some portion of the current function to DCMC. (We titled this alternative 2.) As we evaluated current operations and missions at each organization, we found that not all of the potential alternatives were feasible. The following table provides a list of the alternatives we fully evaluated from both a quantitative and a qualitative perspective.

Organization	Alternative	Description
SUPSHIP	Status Quo (S-SQ)	Today's operations
	S-1A	Transfer CAS to DCMC, personnel stay in place
	S-1B	Not evaluated [1]
	S-2	Not evaluated[1]
ONR	Status Quo (O-SQ)	Today's operations
	O-1A	Not evaluated[2]
	O-1B	Transfer CAS to DCMC, personnel move to CAO
	O-2	Not evaluated[2]
Army Ammunition Plants	Status Quo (A-SQ)	Today's operations
	A-1A	Transfer CAS to DCMC, personnel stay in place
	A-1B	Transfer CAS to DCMC, personnel move to CAO
	A-2	Partial transfer of CAS to DCMC, leave some CAS at AAP

Figure 1-3 Names of Alternatives and Definitions

1.4.3.2 Cost Element Structure

After we identified the alternatives, we developed a cost element structure. Consistent with DoD standard cost estimating practices, we separated costs into two categories, investment costs and operations and support (O&S) costs. Investment costs in a business case analysis address the up-front costs required to support any change from the status quo. Within investment costs, we identified two relevant cost elements; investment training and system interface development. Within O&S, we identified two relevant cost elements; recurring training and personnel. The majority of the costs fell into the personnel category, so this category was further segregated depending on the alternative.

[1] Due to the nature of the work and its impact on overall mission, we determined that the CAS function could not be moved off-site for SUPSHIP (alternative S-1B). As the analysis will reveal, there are no "pure" CAS functions at SUPSHIP. To determine exactly what functions and the number of people involved in a partial CAS transfer would require a site by site analysis and more data than was available. Also, separating the CAS function across two organizations was determined to not be a good business approach. Therefore, alternative S-2 was not evaluated.

[2] Due to the close proximity of DCMC offices and ONR regional offices, we determined that it would be impractical to transfer CAS functions to DCMC without physically moving people to the DCMC spaces (Alternative O-1A). Additionally, because of the overall small number of personnel performing the CAS functions for ONR and due to the relative uniformity of their grant administration functions, there was no logical scenario for transferring only a part of the function (Alternative O-2).

Investment Costs	
1.1 Training	Up-front training costs to ensure that personnel are cognizant of DCMC's standard CAS operating policies and procedures.
1.2 System Interface Development	Computer integration costs for ensuring that any existing CAS information systems communicate properly with DCMC's automated CAS system, Mechanization of Contract Administration Services (MOCAS).
Operations and Support Costs	
2.1 Recurring Training	Annual training costs incurred by CAS personnel.
2.2 Personnel	Costs associated with employing personnel. We divided this element into different categories for AAP, SUPSHIP, ONR and DCMC to capture the different burden rates of the respective organizations.[3]

Figure 1-4 Cost Element Structure and Definitions

1.4.3.3 Quantitative Estimate Development Methodology

After we developed a tailored cost element structure, we reviewed documentation, interviewed stakeholders, and utilized professional judgment to populate our model. Our first task was to identify costs associated with the status quo alternatives, thus capturing the baseline. After we identified the status quo costs, we assigned costs to the alternatives that we identified. We used a “bottoms up” approach for assigning costs to the alternatives so each estimate is a function of many inputs. Our task statement explicitly directed the use of "currently available" data. Where data was not available or precise, our direction was to "use estimates and caveat" our results. We recognized that many of the inputs were inexact. Therefore, in keeping with standard cost estimating practices, we assigned low and high ranges to some of these more esoteric cost estimates. Thus, our results are presented as ranges comprised of low, most likely, and high cost estimates. The basis of estimate for these alternatives is discussed at length in the respective appendices.

We also present our alternatives in three types of dollars: constant, inflated, and discounted. Constant dollars are used as a starting point, not incorporating inflation or the time value of money. For budgetary purposes, we provided inflated costs to determine how much money to set-aside for the alternative in question. For comparative purposes, we also provided discounted costs that incorporate the time value of money.

[3] Personnel costs include the direct and indirect costs of employing staff, i.e., salaries, benefits, facilities, supplies, Information Technology, training, etc. The indirect costs for each organization were calculated and applied as a “burdened factor” to that respective organization's average CAS salary. For example, if a GS 15 is compensated at $90K per year, their actual cost to the Government is greater than that, perhaps as much as 1.8 times $90K, per year or $162K. The overhead calculations addressed in this study are provided in Appendix C.

1.4.3.4 Quantitative Estimate Assumptions

- While costs will continue indefinitely, changes in workload and other environmental factors are likely at some point in the future. For ease of comparison, we chose a 10 year “steady state” period for quantifying each of the alternatives.
- We compared total costs to DoD associated with performing the CAS function only. Non-CAS costs were included only if there was an additional cost that needed to be incurred to make a specific alternative feasible.
- Only “incremental” DCMC costs associated with CAS functions at the candidate organizations are captured. In other words, the total cost of DCMC is not included.
- We utilized OMB A-94 inflation factors (2.3% for budgetary purposes) and discount rate (3.6% for comparative purposes on a 10-year project).
- Sunk or prior year costs are not included.

1.4.3.5 Qualitative Comparison Methodology

To assist in capturing the value of the qualitative factors in relation to the performance of CAS in the various alternatives, the software tool "Expert Choice®" was utilized. Expert Choice® is a multi-criteria decision support tool based on the Analytical Hierarchy Process (AHP). The AHP is a powerful and comprehensive methodology for making decisions using both measured data and judgments from the decision maker(s). The AHP assists with the decision making process by allowing decision makers to organize and determine the significance of the evaluation criteria and then subsequently apply the criteria to the alternative solutions. Through the process of structuring a decision into a hierarchical model and then pairwise comparing objectives and alternatives, decision makers can determine the best overall course of action to take.

To apply AHP, criteria for decision making are established and pairwise comparisons of the criteria are performed to determine relative weights of the criteria in relation to each other (reflecting importance of factors in decision making). Once the relative weights are established, alternatives are evaluated against their ability to satisfy or achieve those criteria. These evaluations when combined with the weights yield a relative qualitative value for each alternative.

1.4.3.5.1 Criteria

The qualitative factors used to assess the effectiveness with which CAS is provided are identified and defined in the following table. The factors have been generated from a generic perspective for performing CAS, and are non-specific to any of the three entities being studied. The list of criteria was developed from factors addressed in previous studies combined with factors determined by the study team to be important in the Government contracting process in determining the level of performance of CAS.

Qualitative Factors
One Face to Industry (Performer) - This factor measures the benefit, if any, for a supplier to deal with just one Federal Government interface (i.e. agency), rather than multiple faces, in the administration of its Government contracts. This factor purports that there would be consistency of policy, regulations, interpretations, approaches, responses, processes, etc., if there were only one party with which to deal. Additionally, with a single agency representing the Government, the contractor arguably will not have the opportunity to play one Government agency/entity against another, e.g. in hopes of leveraging his preferred solution.
One Face to the Customer - This factor measures the benefit, if any, for a customer (i.e., the requiring office that puts up the money for the contractor's product/service) to deal with just one interface rather than multiple faces, in the administration of its contracts. This factor purports that there would be consistency of policy, regulations, interpretation, approaches, responses, processes, etc, if there were only one party with which to deal.
Timeliness - This factor measures the time it takes to provide CAS to customers and performers. The focus is on how quickly decisions are made, direction is given, modifications are negotiated/completed, certifications/approvals are given, payments are approved, etc.
Subject Matter Expertise of CAS Staff – This factor measures the ability of the ACO, or other Government personnel performing CAS functions, to make independent judgments, certifications, decisions and conduct negotiations independently based on personal knowledge/experience with the subject matter.
Synergy with the Non-CAS functions – This factor measures how the performance of the CAS functions supports the entire "production" process; i.e. CAS is not a function that is tacked on at the end, or is just trying to keep up, but actually supports/bolsters contract performance.
Independence of CAS functions - This factor measures the importance of having the party performing CAS to be a separate organizational entity from the party that is the buyer and the customer, i.e. a separation of CAS and program office functions to ensure arms length objective transactions.
Achievement of mission objectives/impact on military readiness – This factor measures the importance of the contract administration functions in supporting the performing organization's achievement of their overall mission.
Ability to recruit, assign, develop & retain CAS staff – This factor measures how effectively the organization performing the CAS functions will be able to staff (recruit and retain) the CAS billets with personnel knowledgeable in the subject area (shipbuilding, ammunition production, basic research) as well as in the performance of CAS functions (safety, quality, pricing, transportation, negotiation, etc.).
Expedience of adopting/implementing acquisition/CAS reforms – This factor measures whether a consolidated approach to performing CAS (i.e. one single organization) lends itself to faster adoption/implementation of acquisition reforms throughout the CAS staff.

1.4.3.5.2 Qualitative Evaluation

Expert Choice® utilizes the process of pairwise comparisons, which allows the evaluator, or decision maker, to look at the elements of a problem in isolation: one element compared to each of the other elements, two at a time. The software tool prompts for the judgments, and then synthesizes all judgments into a unified whole in which the criteria are clearly prioritized from most important to least important. Judgments are made about pairs of elements relative to a criterion or property that they have in common. It is from a multiplicity of these pairwise comparisons across all the elements being compared that we build the information that leads to the priorities.

Members of the Booz·Allen study team performed independent pairwise comparisons, the results of which were entered into Expert Choice®. These inputs became the Booz·Allen team weighted criteria. Inputs from each of the studied organizations were solicited as well. A total of eleven sets of inputs were received from ONR, Army Industrial Operations Command (IOC), and SUPSHIP/NAVSEA. The Government inputs were entered into Expert Choice® to become the Government team weighted criteria. The Government's weighted criteria were then combined with the Booz·Allen study team weighted criteria to develop the composite set of weighted criteria applied in the study. When the two sets of weighted criteria were combined, the individual criteria weights changed slightly, but their rank order of importance did not.

1.4.3.5.3 Weighted Values of Evaluation Factors

The results of the pairwise comparisons are shown in Figures 1-5 and 1-6, which depicts the relative importance of each the criterion in relation to the other criteria that have been selected to evaluate CAS. The results of the criteria weightings are not specific to SUPSHIP, ONR, DCMC or the AAPs but represent a broad DoD perspective of the relative importance of various factors for evaluating CAS performance.

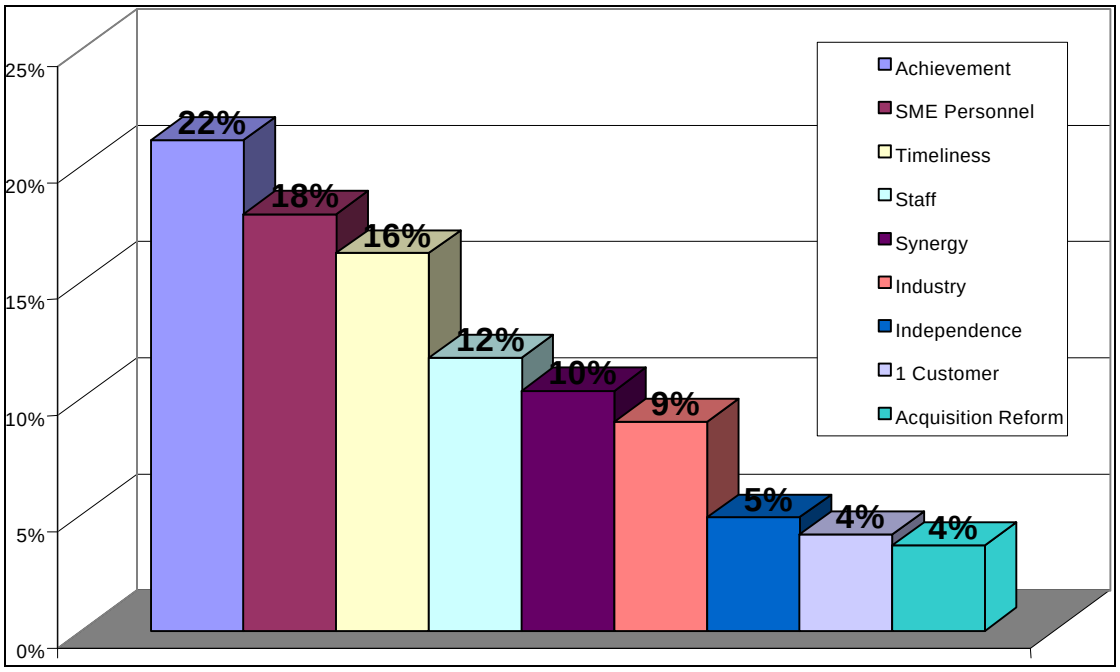


Figure 1-5 Weighted Criteria Used for Qualitative Analysis

Achievement of Mission Objectives/Impact on Military Readiness was determined to be the most important criteria against which the alternative scenarios for performing CAS should be assessed. This criteria's assigned weight of 22% of the total qualitative evaluation criteria indicates that its achievement is crucial in selecting the appropriate scenario for performance of CAS. The top three weighted evaluation criteria (Achievement, Subject Matter Expertise, and Timeliness) make up 56% of the decision criteria in determining how CAS functions can best be provided. The remaining six criteria combine for less than half of the study's relative importance of the qualitative factors in the selection of the optimum scenario for performance of CAS.

Rank	Criteria	Weight
1	Achievement of mission objectives / impact on military readiness	22%
2	Subject Matter Expertise of CAS Staff	18%
3	Timeliness	16%
4	Ability to recruit, assign, develop and retain CAS staff	12%
5	Synergy with the Non-CAS functions	10%
6	One Face to industry (Performer)	9%
7	Independence of the CAS function	5%
8	One face to the customer	4%
9	Expedience of adopting/implementing acquisition/CAS reforms	4%

Figure 1-6 Rankings of Evaluation Criteria

1.4.3.5.4 Alternatives Scoring

Following the weighting process, the evaluators determined as between two alternative scenarios, which scenario best achieved or satisfied a given criteria. For example, in the case of ONR, the nine criteria were evaluated between the S*tatus Quo* and the *Total Delegation of CAS to DCMC* alternative, to determine which scenario best satisfied each criteria. These evaluations were based on data received during our interviews with the staff and customers that do have, or have had, some involvement with DCMC. Their responses include their own comparisons of the services received as well as an extrapolation from their current experiences to the envisioned alternative scenario. The results of this evaluation were combined with the weights for each criteria to yield a total qualitative value for each scenario. The results of the qualitative comparisons are presented in the discussions of each organization in the subsequent sections of this report.

1.4.4 Preferred Alternative & Recommendation

After we developed the cost estimates and qualitatively compared the alternatives, we were able to make a recommendation about which alternative provided the optimum mix of minimizing costs and maximizing performance. This alternative is called the preferred alternative. The results of this step are presented in each of the following three sections of this report.

2 Supervisor of Shipbuilding

2.1 Mission and Background

There are nine Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP) offices, each a field activity of the Naval Sea Systems Command (NAVSEA). The major SUPSHIP mission functions, as defined in the *SUPSHIP Operations Manual* (SOM), June 1994, are:

- The management of DoD shipbuilding, design, conversion, and facility contracts
- The procurement and management of overhaul and repair contracts

In performance of these roles, SUPSHIPs perform ship maintenance planning, project management, procurement, engineering, technical and contract administration functions. SUPSHIP is the on-site representative of NAVSEA and the program manager, managing and coordinating activities involving the ship owner/operator (i.e., the Fleet Type Commander in the case of ship repair, and the Program Executive Officer under the ASN (RD&A) for new construction), the shipyard, and the ship's crew.

It is the SUPSHIP activities associated with their contract management functions that are the focus of this study. These specific functions include the contract administration services (CAS) for contracts involving Naval ship construction, conversion, and repair. SUPSHIPs are designated to perform the contract administration functions listed in FAR Parts 42.2 and 42.3, DFARS 242.302, Navy Acquisition Procedures Supplement, (NAPS) 52.42 and the NAVSEA Contracting Handbook, (NCH) 42.2.

2.1.1 CAS Operations

Various procurement regulations and directives define the SUPSHIP performance of contract award and field contract administration functions. SUPSHIP operating procedures are defined in the *SUPSHIP Operations Manual* (SOM), June 1994. This manual merged the information previously contained in the Ship Acquisition Contract Administration Manual (SACAM) and the Ship Repair Contracting Manual (SRCM). The SOM was developed as an extensive revision of outdated information, and contains current language of the FAR, DFARS, NAPS and NCH. The SOM provides SUPSHIP personnel with a generalized understanding of principles of procurement, administration, and performance of new construction contracts, as well as repair and overhaul contracts. The SOM describes the involvement of SUPSHIP in the processing, approving and controlling of changes, deviations and waivers, and the performance of other contract administration and management requirements.

The SOM describes a particular style of contract administration "involvement" defined by NAVSEA as aggressive contract administration based on an in-depth knowledge of the contractor's operations, especially any weaknesses in areas involving policy, procedure, and performance. In general, involvement includes the monitoring of cost, delivery, completion, and quality, and an understanding of their interrelationships. The SOM specifically states that involvement is not intended to lead to the management of a contractor's operations, but is intended to provide an aggressive approach that encompasses all aspects of contract administration. This aggressive or "involved" approach to contract administration is key to the success of the SUPSHIP operation. That is, it supports the pace with which work and contract modifications must be accomplished, and facilitates the coordination of the contractor's efforts

with those of the ship's crew and other Navy installation teams. It is feared that a more hands-off approach would slow the process.

Unscheduled and unplanned changes that deviate from the specific tasks of a repair contract are an everyday occurrence at SUPSHIP. Requests for Contract Changes (RCCs) or Modification Requests (MRs) are routinely generated to respond to repair requirements that only become apparent after contract award, when the ship's equipment has been "opened and inspected" for identification of specific repairs. For example, the U.S.S. Bunker Hill was scheduled for $15 million worth of repairs during a scheduled availability. It is estimated that at the end of its nine-month availability the total cost to make the ship "mission ready" will be $18 million. The $3 million of additional work was largely the result of additional repairs that could not have been detected until the ship was in the shipyard. This additional work had to be detected, defined, prioritized, priced, scheduled, and negotiated in real time to allow the contractor to begin work immediately. On the U.S.S. Nimitz, it was estimated that over 2,500 RCCs were generated in a nine-month period.

Conclusions made by previous studies of SUPSHIP CAS performance were observed during this study. These conclusions include:

- Timeliness of providing technical and contractual direction to the contractor is critical
- Project Team staff perform both CAS and non-CAS functions
- CAS staff have trade level/journeyman knowledge
- Project Team staff are able to prioritize work to be performed, resolve technical issues, and understand the contractual implications of both

2.1.2 Organization and Responsibilities

The basic SUPSHIP functional organizational unit, which executes the SUPSHIP mission, is the Project Team. This team structure has evolved over time and is designed to optimally manage the contractual, business, and technical oversight; the multiple relationships; and the technical requirements unique to the SUPSHIP environment. The Project Team structure includes marine surveyors with trade specialties such as hull, machinery, electrical, weapons and combat systems, as well as quality assurance representatives, program management personnel, and others. Each team composition will differ depending on the size and complexity of the specific project, i.e., new construction, major conversion, nine-week repair availability, etc. A typical repair project team will consist of approximately 13 staff representing the following roles and functions:

- Ship Superintendent
- Administrative Contract Officer
- Program Manager
- Ship Surveyor (Trade Specific)
- Quality Assurance
- Material Management
- Finance
- Safety/Environment
- Barge Representative
- Design

As members of this Project Team, SUPSHIP personnel perform a wide range of functions. In addition to their delegated CAS functions, their role is to provide on-site field technical and engineering expertise as an essential part of the extension of NAVSEA's and/or the program manager's technical, contractual and programmatic authority and responsibility. Many SUPSHIP personnel do not distinguish, or know the difference, between the CAS and non-CAS functions they perform. The Project Team typically sequences and integrates the work of the ship's crew and other Navy repair activities with the shipyard's work. The Team also assists the ship's crew in overseeing contractor work.

As the Navy's single point of contact for resolution of technical and contractual problems, SUPSHIPs perform a range of functions, which include

- Participating in test and operation of naval ship propulsion plants
- Serving as Procuring Contract Officer (PCO) with the authority to issue orders under Master Ship Repair Agreements / Agreements for Boat Repair
- Negotiating with the Fleet on customer issues of scope and schedule
- Performing planning yard engineering and design services for assigned ship classes
- Ensuring the safety and welfare of the ship, its systems (including fuel and ammunition), and its embarked crew while at the contractor's plant.

2.1.3 Recent Changes

SUPSHIP has reorganized, realigned and incorporated process improvements that have caused them to operate more efficient and intelligently. SUPSHIP offices are sharing their resources and intellectual capital, standardizing approaches and specification language, and allocating their workload more equitably across the workforce.

2.1.3.1 Recent Downsizing and Realignment

There are currently nine SUPSHIP offices, each reporting as a separate field activity command to NAVSEA. Since the joint OSD/DLA/Navy review of SUPSHIP CAS functions was conducted in 1992, the Navy has restructured and reduced SUPSHIP staffing to take advantage of management efficiencies. For example, the following six SUPSHIP offices have been closed:

- SUPSHIP Boston, MA
- SUPSHIP Brooklyn, NY
- SUPSHIP San Francisco, CA
- SUPSHIP Long Beach, CA
- SUPSHIP Sturgeon Bay, WI
- SUPSHIP Charleston, SC

SUPSHIP has consolidated operations with the establishment of Business Operating Centers at Portsmouth (for the East Coast), Jacksonville (for the Southeast and Gulf Coast areas) and San Diego (for the West Coast).

2.1.3.2 Process Improvements

In addition to organizational restructuring and regionalization, SUPSHIP has made process improvements aimed at gaining efficiencies in planning (contract specification development), contracting (PCO as well as ACO functions), technical documentation storage and

management, and the employment of automation to accommodate the movement of work instead of the movement of workers. For example, SUPSHIP has:

- Enhanced the contract methodology from using mostly firm fixed price contracts based on lowest bid, to the utilization of "best value" analysis and alternate forms of contracting to provide the responsiveness necessary to meet the fleet needs
- Developed the Indefinite Delivery Time Contract for specific type work functions, such as steam system repair
- Developed standardized contract specification language for nationwide use
- Adapted quality assurance as a result of ISO-9000 standard implementation, reducing the number of Government checks and process validations
- Established the formal Lessons Learned program integrated into the automated field office software, to capture and use the information to improve the process
- Standardized automated information systems to facilitate electronic interchange of information among SUPSHIPs as well as between SUPSHIP and the contractor

2.2 Definition of the SUPSHIP Status Quo

The Navy is currently operating their nine SUPSHIP offices with a total of 2665 staff, as shown in the Figure 2-1 table below. These 2,665 staff are assigned to the SUPSHIP Project Teams and regularly perform project management and planning, procurement, engineering, technical support and contract administration functions.

SUPSHIP Location	Current Staffing (CAS and non-CAS)
Bath	218
Groton	210
Jacksonville	180
New Orleans	290
Newport News	386
Pascagoula	332
Portsmouth	417
Seattle	102
San Diego	530
Total	**2,665**

Figure 2-1 SUPSHIP Staffing

All SUPSHIP billets are structured to be multi-functional. Assigned personnel perform CAS, delegated CAS and non-CAS functions interchangeably throughout the course of a normal workday. Previous NAVSEA and SUPSHIP studies have determined that about 27% of ship repair workload is associated with executing CAS functions. For new construction, studies have estimated that about 35% of the workload is attributed to the performance of CAS. Similar

estimates were provided during the Booz·Allen study. Figure 2-2 shows the 1997 overall SUPSHIP workload estimated for each functional area.

	New Construction			**Repair**			
	CAS	Non-CAS	TOTAL	CAS	Non-CAS	TOTAL	Grand Total
Work Years	406.5	752.8	1159.3	402.9	1102.6	1505.5	2,665*
Percent	35%	65%		27%	73%		

Figure 2-2 SUPSHIP Fiscal Year 1997 Workload

The estimated cost of performing the CAS functions in the current SUPSHIP Status Quo is as follows:

	New Construction	**Repair**	**Total**
$ Million	27.1	26.8	53.9

Figure 2-3 SUPSHIP Fiscal Year 1997 Total CAS Cost

The main element of these costs is the cost of the civilian and military personnel. These estimates were calculated by multiplying the work years associated with CAS times the average SUPSHIP salary. Detailed cost date is presented in Appendix E.

2.3 Definition of the Alternative CAS Scenario

2.3.1 Background

For this study, we visited three SUPSHIP offices and the shipyards over which they have plant cognizance, including both new construction and repair. The objective of these visits was to become more familiar with office operations and to experience the environment in which SUPSHIP personnel perform their daily tasks. We met with DCMC Customer Service Representatives at DCMC Headquarters to discuss the possible scenarios which would result from the transfer of CAS functions, to obtain an understanding of the manner in which the transfer would be accomplished and to assess any related operational and resource implications.

The alternative scenario evaluated in this study is the transfer of all SUPSHIP CAS responsibilities, as reflected in FAR 42.302(a), to DCMC. If these CAS functions were delegated to DCMC, NAVSEA/SUPSHIP determined that SUPSHIP would retain the CAS functions reflected in FAR 42.302(b), as well as all of the non-CAS SUPSHIP functions. For ease of reference, we have referred to all functions retained by SUPSHIP as “non-CAS.”

2.3.2 Assumptions

As confirmed by DCMC and Navy SUPSHIP management, the transfer of CAS functions would be accomplished on an "as-is, where-is" basis with the transfer of billets and the reassignment of personnel from the Navy’s SUPSHIP offices to DCMC.

* indicates number has been rounded

Currently, DCMC's only involvement in the contract administration of ships is a small team supporting the Military Sealift Command (MSC) through a Memorandum of Agreement established in 1995. DCMC is not involved with administration of the construction, conversion or scheduled maintenance of these ships, and has no experience in administration of Navy ships other than limited experience with small boats and craft. According to DCMC headquarters representatives, 12 personnel perform the CAS functions for MSC today. The MSC contract includes oversight of minimal maintenance on the forward-deployed Maritime Prepositioning Ships (MPS), but does not include oversight of the periodic long-term overhauls scheduled every three years. The contractor ship repair work associated with this oversight is not the same as that which is overseen by SUPSHIP.

Consequently, the unique requirements associated with Navy ship repair and new construction CAS functions, along with the magnitude of workload transferred, suggest that an in-place transfer would be most practical. In addition, the need for close and continuous daily communications between the Government on-site team, the contractor, and the ship's crew requires that the newly transferred DCMC personnel remain on the waterfront in the shipyard environment.

As described earlier, the estimated ratio of level of effort of non-CAS to CAS functions is about 70/30. At each integrated SUPSHIP operation, the same personnel currently perform CAS and non-CAS functions. Separation of these functions would require a detailed site-by-site, billet by billet, resource and workload assessment to determine the CAS/non-CAS responsibilities. This analysis would be required to determine how the CAS and non-CAS functions would be split among the specific billets and how personnel would be assigned. Absent this detail, our alternative scenario analysis depended on generalizations, extrapolations and analogies across SUPSHIP operations.

2.3.3 Functional Organization and Relationships

For purposes of this study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to the performance of SUPSHIP's non-CAS functions. Separate analyses were conducted for ship repair and for new construction operations. These analyses, which are explained in Appendix D, SUPSHIP Workload Analysis, determine the combined SUPSHIP and DCMC personnel levels required to perform the SUPSHIP mission, with the combined organizations, at a level of service which closely approximates that which is provided by the integrated SUPSHIP Project Teams today. We costed this analysis and given the results, i.e., an additional 270 billets required to satisfy the SUPSHIP mission by delegating CAS to DCMC, this was not considered a viable business alternative. To attempt to calculate an appropriate business alternative, we extrapolated the workload analysis data from the Navy and applied it in a mathematically different fashion. This is described as Alternative S-1A.

Under the Alternative S-1A scenario, the DCMC staff would be responsible for performing contract administration, including assurance of contractor compliance with cost, delivery, technical, quality and other terms of the contract. DCMC staff would also be responsible for accepting products on behalf of the Government, and paying the contractor. These tasks are closely tied to the daily operations of SUPSHIP, and would require direct and continuous communications between SUPSHIP, DCMC, the contractor, the Type Commander, and the ship's crew.

The SUPSHIP personnel, as on-site representatives of NAVSEA and the program manager, would continue to maintain a close relationship with the ship owner/operator. They would continue to sequence and integrate the work of the ship's crew, and other Navy repair activities with the shipyard's work. They would also continue to assist the ship's crew in overseeing contractor work and in ensuring fleet readiness and life cycle operability of the completed ship. Their role in providing on-site field technical and engineering support would continue as an essential part of the extension of NAVSEA's and/or the program manager's technical, contractual and programmatic authority and responsibility.

The resultant cadre of organizationally segregated SUPSHIP and DCMC personnel would be required to interact closely. A constant, seamless coordination with each of the organizations working in the waterfront environment would be mandatory.

2.4 Comparison of the Alternatives

2.4.1 Quantitative

The quantitative comparison to be made is the total cost of operations associated with the management of Navy ship repair and new construction contracts, including total CAS functions and additional non-CAS personnel, for the existing scenario and the proposed alternative. The Booz·Allen study team members conducted a cost comparison of two alternatives for a 10-year investment and operations period. These two alternatives are:

- Alternative S-SQ (Status Quo)--Alternative S-SQ is defined as leaving the CAS function as the responsibility of SUPSHIP. SUPSHIP would continue to operate in the same manner as they do today. More specifically, personnel in their existing roles would accomplish the CAS, delegated CAS, and non-CAS workload.
- Alternative S-1A--Alternative S-1A is defined as DCMC taking responsibility for the CAS functions at SUPSHIP. Under this scenario, some percentage of existing SUPSHIP employees would become DCMC employees. The SUPSHIP non-CAS workload would continue to be accomplished by SUPSHIP personnel.

The study team collected all necessary cost data to verify co-equal treatment and comparison of the four alternatives. The comparison considered the following cost categories:

- **Investment Costs**
  - Training
  - Systems Interface Design
- **Operations and Support Costs**
  - Recurring Training
  - DCMC Personnel (Additional for New Construction)
  - DCMC Personnel (Additional for Repair)
  - SUPSHIP Non-CAS Personnel (Additional for New Construction)
  - SUPSHIP Non-CAS Personnel (Additional for Repair)
  - SUPSHIP CAS Personnel (New Construction)
  - SUPSHIP CAS Personnel (Repair)

The Basis of Estimate for these costs, the complete cost summary for each alternative, and the monte carlo simulation are provided in Appendix E, SUPSHIP Detailed Cost Estimate and Basis of Estimate.

2.4.1.1 Alternative S-SQ Costs

Alternative S-SQ captures the costs associated with continuing the existing operations. As such, the only cost elements under this alternative are the SUPSHIP CAS Personnel (New Construction) and SUPSHIP CAS Personnel (Repair).

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	Repair CAS Workyears (Status Quo)
Bath	61.0	0.6
Groton	57.7	0.9
Jacksonville	1.5	56.8
New Orleans	87.7	20.7
Newport News	83.8	31.6
Pascagoula	85.4	15.9
Portsmouth	0	120.5
Puget Sound	0	25.9
San Diego	29.4	130

Figure 2-4 Status Quo: New Construction and Repair CAS Workload at SUPSHIP

The new construction CAS personnel costs are approximately $27.1 million per year and the repair CAS personnel costs are approximately $26.8 million per year. For a detailed cost estimate along with a basis of estimate, see Appendix E. For comparative purposes, the ten year discounted cost for this alternative equals $446.3 million.

2.4.1.2 Alternative S-1A Costs

Under this alternative, the SUPSHIP CAS personnel become DCMC personnel. The DCMC CAS personnel stay on-site and continue to function as members of the SUPSHIP Project Teams. Compared to the status quo, the costs for this alternative are captured in different elements, as described in the Basis of Estimate in Appendix E.

Investment costs were captured in this alternative. If the CAS personnel at SUPSHIP became DCMC employees, we assumed that they would engage in limited DCMC training. This was estimated at $2.7 million and was spread across the first two years. We further assumed some system interface costs to connect SUPSHIP CAS information systems with DCMC's. These costs equaled $1M.

Based on the extrapolation of project team data that we received from SUPSHIP, the number of new construction CAS workyears increases by 1.8% when the CAS and non-CAS functions are separated. Applying the 1.8% to the CAS workyears at each SUPSHIP, a total of 410.8 workyears is required in this alternative. The cost for this element is $30.2 million per year. See the Basis of Estimate and the spreadsheets in Appendix E for a more thorough description.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	New Construction CAS Workyears (Alt S-1A, Partial)	New Construction CAS Workyears (Alt. S-1A, Full)
Bath	61.0	61.6	62.0
Groton	57.7	58.3	59.0
Jacksonville	1.5	1.5	2.0
New Orleans	87.7	88.6	89.0
Newport News	83.8	84.7	85.0
Pascagoula	85.4	86.3	87.0
Portsmouth	0.0	0.0	0.0
Puget Sound	0.0	0.0	0.0
San Diego	29.4	29.7	30.0
Total	**406.5**	**410.8***	**414.0**
	Percentage Increase:	**1.1%**	**1.8%**

Figure 2-5 Comparison of Number of New Construction CAS Workyears for the Status Quo and Alternative S-1A

Similarly, extrapolating project team data from the SUPSHIP model, the number of repair CAS workyears increases by 3.5% when CAS and non-CAS are separated. A total of 417 work years of CAS is required in this alternative as shown in Figure 2-6. The total cost of this element is $30.4 million per year.

* indicates number has been rounded.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	New Construction CAS Workyears (Alt S-1A, Partial)	New Construction CAS Workyears (Alt. S-1A, Full)
Bath	0.6	0.6	1.0
Groton	0.9	0.9	1.0
Jacksonville	56.8	58.0	59.0
New Orleans	20.7	21.2	22.0
Newport News	31.6	32.3	33.0
Pascagoula	15.9	16.2	17.0
Portsmouth	10.5	123.1	124.0
Puget Sound	25.9	26.5	27.0
San Diego	130.0	132.9	133.0
Total	**402.9**	**411.8***	**417.0**
	Percentage Increase:	**2.2%**	**3.5%**

Figure 2-6 Comparison of Number of Repair CAS Workyears for the Status Quo and Alternative S-1A

Separation of CAS and non-CAS impacts the non-CAS workyears required also. In this alternative, the number of new construction non-CAS workyears increases by 1.6%, or a total of 12 workyears. Even though these are non-CAS costs, we had to capture them in this analysis as incremental costs to DoD. This additional cost is estimated at $800,000 per year.

SUPSHIP Facility	Total CAS Del and Non-CAS New Construction Workyears (Status Quo)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Partial)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Full)
Bath	111.6	1.4	2.0
Groton	137.4	1.7	2.0
Jacksonville	0.9	0.0	1.0
New Orleans	147.4	1.8	2.0
Newport News	156.9	1.9	2.0
Pascagoula	155.4	1.9	2.0
Portsmouth	0.0	0.0	0.0
Puget Sound	0.0	0.0	0.0
San Diego	43.2	0.5	1.0
Total	**752.8**	**9.1***	**12.0**
	Percentage Increase:	**1.2%**	**1.6%**

Figure 2-7 Comparison of Number of New Construction non-CAS Workyears for the Status Quo and Alternative S-1A

Similarly, the repair non-CAS workyears increase by 5.9%. As shown in Figure 2-8, this increase totals 65 workyears, for a total of $4.3 million per year. Even though these are non-CAS costs, we capture them in this analysis as incremental costs to DoD when CAS and non-CAS are separated. See the Basis of Estimate and the spreadsheets in Appendix E for a more thorough description.

* indicates number has been rounded

SUPSHIP Facility	Total CAS Del and Non-CAS New Construction Workyears (Status Quo)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Partial)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Full)
Bath	44.8	2.5	3.0
Groton	14.4	0.8	1.0
Jacksonville	120.5	6.6	7.0
New Orleans	34.2	1.9	2.0
Newport News	113.7	6.2	7.0
Pascagoula	75.3	4.1	5.0
Portsmouth	296.5	16.3	17.0
Puget Sound	75.7	4.2	5.0
San Diego	327.6	18.0	18.0
Total	**1102.6***	**60.6**	**65.0**
	Percentage Increase:	**5.5%**	**5.9%**

Figure 2-8 Comparison of Number of Repair non-CAS Workyears for the Status Quo and Alternative S-1A

2.4.1.3 Quantitative Comparison of the Alternatives

The discounted costs associated with delegating CAS to DCMC could range between $504.8M to $612.8M. The most likely cost is $540M. These ranges are based on the monte carlo simulation described in the methodology section.

	SUPSHIP Status Quo Discounted Cost	SUPSHIP Alternative S-1A Present Value Cost
Low	$446.3M	$513.5M
Most Likely Cost	$446.3M	$549.1M
High	$446.3M	$614.3M

Figure 2-9 SUPSHIP Cost Comparison (10 Year Investment and Operations)

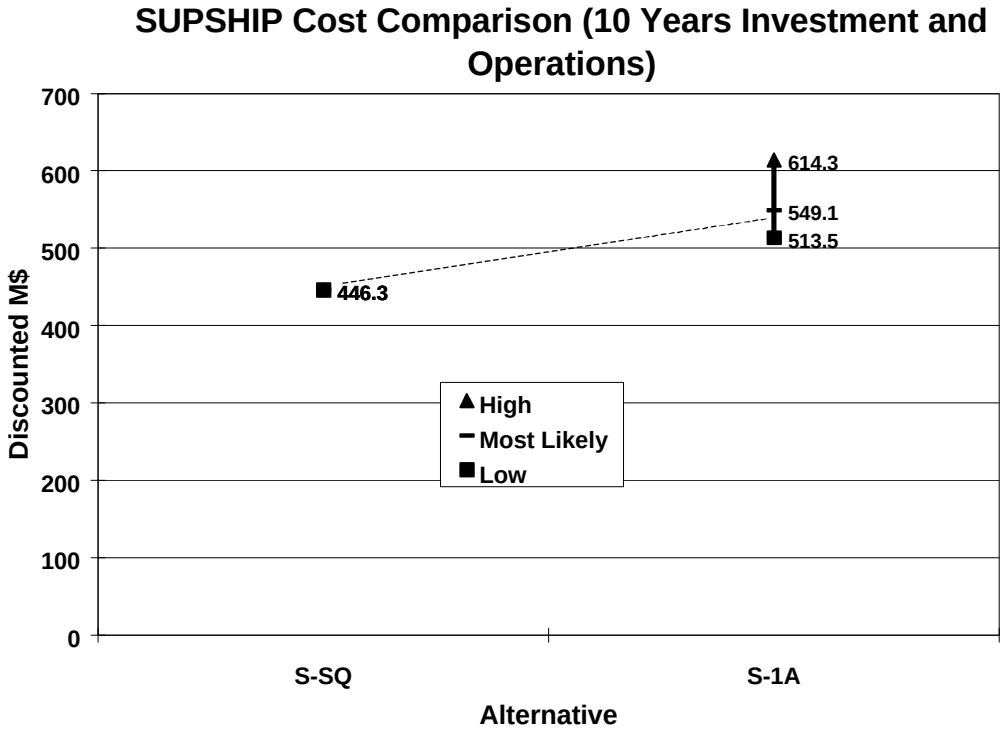


Figure 2-10 SUPSHIP Graphical Cost Comparison

The status quo alternative is clearly more cost effective. Over a ten year life cycle, the cost estimate for the delegation of CAS to DCMC is approximately $100M more than the cost estimate for the status quo, as shown in Figure 2-10.

2.4.2 Qualitative

The Booz·Allen study team applied the qualitative factors, described in Section 1.4.3.5 above, to the two alternative scenarios. This section describes the results of the qualitative comparison of the proposed CAS alternative to the status quo. For convenience, Figure 2-11 repeats the relative weights assigned to each factor through the process described in Section 1.4.3.5.

FACTOR	WT
Achievement of Mission Objectives	22%
Subject Matter Expertise of CAS Staff	18%
Timeliness	16%
Ability to Recruit, Assign, Develop, & Retain Staff	12%
Synergy with the Non-CAS Functions	10%
One Face to Industry	9%
Independence of CAS Functions	5%
One Face to Customer	4%
Expedience of Adopting/Implementing Acquisition CAS Reforms	4%

Figure 2-11 Weighted Value of Qualitative Factors

The result of the qualitative comparison indicates that the Status Quo was assessed to be more than 50% better at satisfying the qualitative factors than transferring CAS to DCMC.

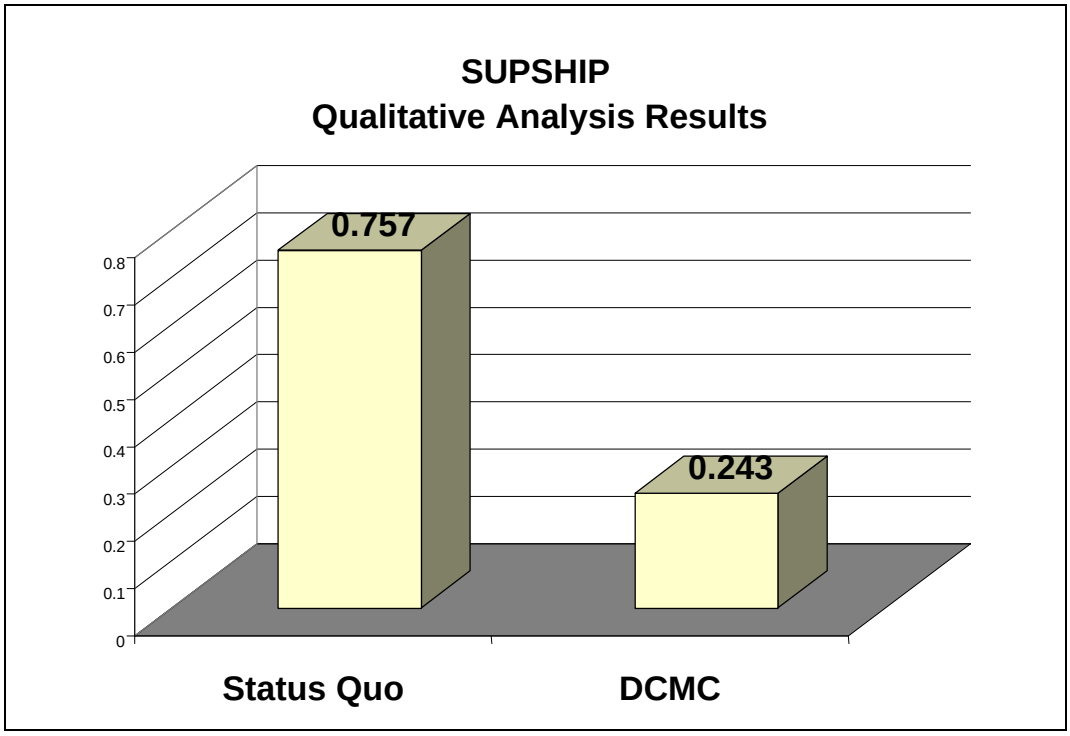


Figure 2-12 Qualitative Comparison of CAS Alternatives

"Achievement of Mission Objectives" was determined to be the most important qualitative factor. The study team determined that the status quo operation was better able to achieve SUPSHIP's mission. The other factors either provide support to achieve the mission objective, such as timeliness and subject matter expertise, or contribute to the professionalism and discipline of performing Government contract administration, such as one face to industry and the expedience of adopting acquisition reform.

The main considerations in determining the relative qualitative preferences are 1) the "as-is, where is" manner in which the transfer will be executed, and 2) the organizational division created on the waterfront with the introduction of another Government activity in waterfront operations. The unique nature of the work environment and trade skills involved cause DCMC to accomplish the transfer in this "as-is, where is" manner. However, use of former SUPSHIP personnel by DCMC limits value added which might be gained through the use of DCMC personnel who have more formal CAS experience and training.

One major impact of this scenario is that it precludes large-scale consolidation of the transferred CAS functions within the existing structure of DCMC. Expectations for streamlining and reductions in personnel must be tempered by the reality that this segment of DCMC is not easily integrated into the mainstream organization, either functionally or culturally. Working in the waterfront environment, alongside the Navy crew, remaining SUPSHIP personnel, other Navy repair and modernization teams and program management representatives, is a different milieu than currently found anywhere in DCMC.

The transfer of SUPSHIP personnel to DCMC would create an unusual relationship between the Government activities assigned to oversee the contract. The introduction of another Government agency on the waterfront, working closely with the contractor, the ship's crew and the other Navy repair and modernization teams, would add a level of complexity to the required communications and legal responsibilities. These additional relationships are envisioned to have a significant impact on the successful execution of contracts in a timely, cost effective manner.

This increase in the number of personnel involved in daily operations complicates communications, creates multiple and complex relationships on the waterfront and increases the risk associated with completion of an operationally ready ship, on time and within cost. The alternative organization would be less efficient due to the loss of flexibility and synergy currently achieved by having members of the same SUPSHIP organization perform these functions. Regarding the "One Face to Industry" qualitative factor, Navy ship repair and new construction presently interfaces with one DoD CAS organization, NAVSEA, through the SUPSHIP offices. In the alternative scenario, there would be two organizations interfacing with the shipyards, one for strictly CAS functions, and the other for technical, program management and customer coordination. The customer would also be dealing with two or more governmental organizations.

2.5 Recommendation

In summary, this model shows that more personnel (SUPSHIP and DCMC) will be required to accomplish the existing CAS, and non-CAS workload under the evaluated alternative scenario. The reasons for this are a combination of the following:

- The multiple trade skills involved in project management
- The loss of efficiencies realized through the synergy and cross utilization of these skills in the Project Management Team, and
- The need to create additional billets to align CAS and non-CAS workload with the personnel assigned to the two distinct organizations.

This analysis supports the recommendation to retain CAS responsibility for Navy ship new construction and repair under SUPSHIP/Navy cognizance. The quantitative and qualitative analyses both show this alternative to be the most favorable. The additional costs to DoD, without qualitative benefit and with an increase in risk, is substantial justification for leaving the CAS responsibility under SUPSHIP.

3 Office of Naval Research

3.1 Background and Mission

The Office of Naval Research (ONR) coordinates, executes, and promotes the science and technology programs of the United States Navy and Marine Corps through universities, Government laboratories, and nonprofit and for-profit organizations. It provides technical advice to the Chief of Naval Operations and the Secretary of the Navy, works with industry to improve technology manufacturing processes while reducing fleet costs, and fosters continuing academic interest in naval relevant science from high school through post-doctoral levels.

The Office of Naval Research University Business Affairs Division (UBA) (ONR 24) is responsible for establishing and maintaining effective business relationships between ONR and the university research community. The office carries out contract and grant administration, indirect cost rate negotiations, business system reviews and quality assurance responsibilities. UBA administers contracts and grants (with educational and nonprofit institutions) issued by ONR, as well as by the Department of Defense (DoD), the Army, the Air Force, the National Aeronautics and Space Administration (NASA), Department of Energy (DOE), and other Federal agencies. In 1997, the Department of Defense alone awarded $2.3B in grants to universities and nonprofit organizations, of which 96% were administered by ONR.

A major role for UBA is the development of DoD-wide policies; procedures and objectives associated with contract and grant administration and indirect cost rates at educational institutions. In addition, the office conducted the first testing of Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT) for invoicing and payments under contracts and grants with educational institutions within the Department of the Navy. This electronic payment method dramatically reduces paperwork requirements, improves cash management, and speeds payments to grantees and contractors.

3.1.1 ONR Authority

ONR, established by law in 1946, is charged to perform duties prescribed by the Secretary of the Navy relating to:

1) The encouragement, promotion, planning, initiation, and coordination of naval research;
2) The conduct of naval research to assist with the research and development conducted by other offices and agencies of the DON; and
3) The supervision, administration, and control of activities within or for the DON relating to patents, inventions, trademarks, copyrights, royalty payments, and matters connected therewith.

3.1.1.1 Authority for Grant and Contract Administration with Educational Institutions and Non-Profits

ONR provides Grant and CAS (G&CAS) for other Navy, DoD, NASA and other Federal agencies when appropriate. The G&CAS functions include contract and grant post-award management at all educational institutions for DoD and for other Federal agencies on a cost reimbursable basis.

In a July 31, 1966, memorandum to the Assistant Secretary of the Navy for Research and Development, the Assistant Secretary of Defense for Installation and Logistics, assigned ONR as the DoD representative for field administration services for contracts and grants with educational institutions located in the United States, Alaska, Hawaii, Canada, Puerto Rico and the Virgin Islands.

3.1.1.2 The Department of Defense Grant and Agreement Regulation

The DoD Grant and Agreement Regulations (DoDGARs), DoD 3210.6-R, assigns the responsibility for performing field administration services for grants and cooperative agreements. Specifically, it designates ONR as the administrator of grants and cooperative agreements for the following:

1) Institutions of higher education and laboratories affiliated with such institutions, to the extent that such organizations are subject to the university cost principles in OMB Circular A-21.
2) Non-profit organizations that are subject to the cost principles in OMB Circulars A-122, if their principle business with the DoD is research and development.[4]

The DCMC and its field offices have responsibility of administering grants and cooperative agreements for all other organizations to include:

1) For-profit organizations.
2) Non-profit organizations identified in OMB Circular A-122 that are subject to for-profit cost principles in 48 CFR part 31.
3) Non-profit organizations subject to the cost principles in OMB circular A-122, if their principal business with the Department of Defense is other than research and development.
4) State and local Governments.

3.1.1.3 Federal Directory of Contract Administrative Services Components

The Federal Directory of Contract Administration Services Components, dated February 1999, identifies the component assigned to provide G&CAS within a designated geographic area or a specific contractor plant. This directory is maintained by DCMC and its use is mandatory by all DoD agencies. Section 2A of the directory identifies ONR regional offices as the performer of CAS functions to universities within their respective geographic areas.

3.1.2 ONR Contract and Grant Post Award Administration Organization

The UBA Division (ONR 24) has the overall responsibility for managing the post award grant and contract administration functions. There are currently 81 staff in the UBA division, of which 23 Full Time Equivalents (FTEs) are reimbursable from NASA to support grants administration. The UBA staff is focused primarily on the performance of G&CAS, but also support policy making, project management, university relations and training. ONR UBA offices are located at ONR Headquarters in Arlington, VA; 5 regional offices located in Atlanta, Boston,

[4] DOD 3210.6-R, DOD Grant and Agreement Regulations

Chicago, San Diego and Seattle; and 4 Engineering Support Offices. Figure 3-1 shows the UBA organization.

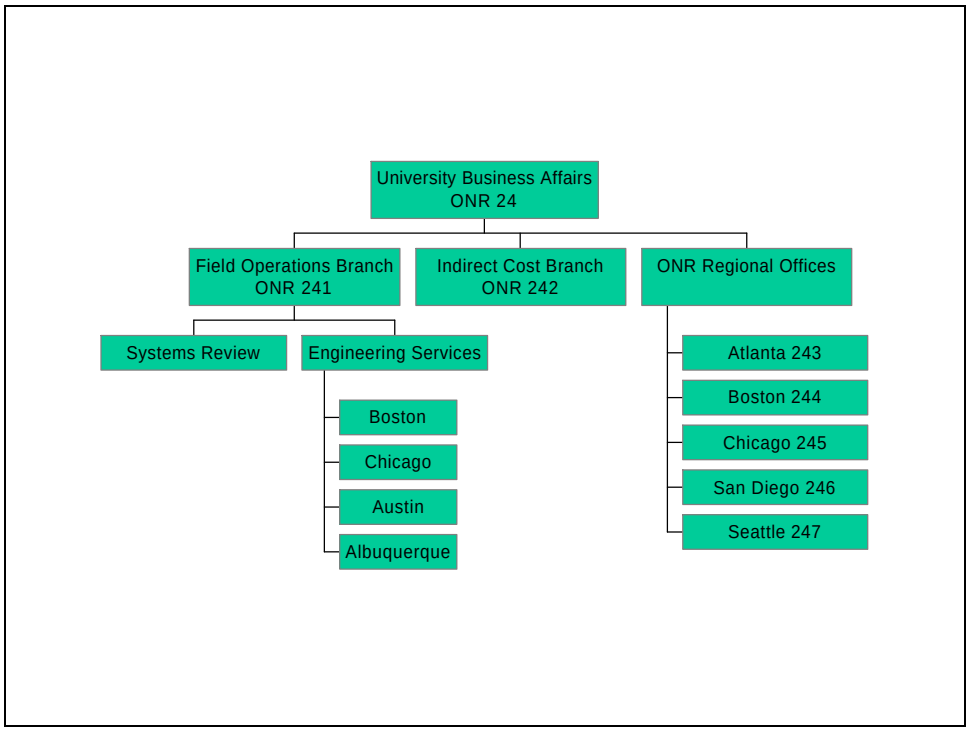


Figure 3-1 ONR University Business Affairs Organization

3.1.2.1 Headquarters and Field Operations (ONR 241)

The ONR 24 Headquarters manages the Regional Offices and develops, coordinates, and implements contract administration policies and procedures. The Field Operations Branch provides specialized support to the regional offices in the areas of contractor business systems monitoring, property administration, quality assurance, safety surveillance, and engineering services. The Field Operations Branch includes staff at Headquarters, Boston, MA, Chicago, IL, Austin, TX and Albuquerque, NM. The field operations support branch is comprised of:

1 Supervisory Contracts Specialist	GM-1102-15
2 Supervisory Procurement Analysts	GS-1102-14
4 General Engineers	GM-801-13
2 Contract Specialists	GS-1102-13
1 Secretary	GS-0318-06

The Field Operations Support Engineers work with procuring activities to ensure that hardware and software deliverables from universities meet Government contract requirements. In support of ONR's negotiation of indirect cost rates at ONR cognizant universities around the country, the engineers also lead a multi-agency Government team in the review of Utility Cost Allocation Studies (UCAS).

ONR has also assisted in developing policy specific to grants administration for universities and nonprofit organization. They have taken an active role in the FAR part 45 rewrite for Government Property related to non-profits and universities and have participated in the development of the DoD Property Manual. Additionally, ONR is in the process of developing training regarding DoD grants administration training offered through the Defense Acquisition University.

ONR provides the Government Administration Representative to the Executive Committee and chairs the Terms and Conditions Committee for the Federal Demonstration Partnership (FDP), which is a consortium of 65 universities and 7 non-profit members. The mission of the FDP is to make the research enterprise work better by removing from researchers any unnecessary bureaucratic burdens while ensuring there are necessary safeguards to protect against fraud. Also unique to the basic research of universities are policies addressing the use of human and animal subjects.

The Field Operations Branch is responsible for managing the ONR programs for oversight of property and purchasing systems at universities and non-profit organizations assigned to ONR for field contract administration. The Branch conducts Property Control System Analyses (PCSA) and Contract Purchasing System Reviews (CPSR). A PCSA is a review of an Institution's property control system performed to determine whether it is capable of controlling, protecting, preserving and maintaining Government property. A CPSR is an onsite review of an institution's purchasing system. The objective of a CPSR is to evaluate the efficiency and effectiveness with which the institution spends Government funds and how well it complies with Government policy when subcontracting. The review provides the ACO with a basis for granting or withdrawing approval of the institution's purchasing system.

At least once every three years, the ONR ACO performs a risk assessment for each institution with annual expenditures from DoD and NASA awards in excess of $25 million. The ACO considers the volume, complexity and dollar value of the institution's purchasing and subcontracting activity and the institutions past performance (e.g. prior CPSRs or independent audits). Based on the ACO's recommendations, the Branch develops an annual CPSR schedule.

3.1.2.2 Indirect Cost Branch (ONR 242)

The Indirect Cost Branch plans and exercises control over the quality and responsiveness of the indirect cost and contract audit resolution programs. These programs encompass the preparation, negotiation, execution, and administration of indirect costs, cost accounting standards determination and other accounting and allocation issues at assigned educational institutions and nonprofit organizations.

The Indirect Cost Branch is located at ONR headquarters and is comprised of the following:

1 Supervisory Contract Specialist	GM-1102-15
1 Contract Specialist	GS-1102-14
1 Contract Cost/Price Analyst	GS-1102-13
1 Grants Specialist	GS-1101-09

The Indirect Cost Branch assists the Office of Management and Budget, (OMB) in the development of policy in regard to university and non-profit organizations. Specifically, they have assisted in the development or revision of OMB Circulars A-21, A-122, and A-133, which provides guidance to universities and nonprofit organizations in regard to applicable cost principles and Cost Accounting Standards. ONR also provides support to the National Research Council, library and utility studies working groups and to such groups as Council on Government Relations, Office of Science and Technology Policy (OSTP) and the Presidential Review Directive (PDR) on Government/University Partnership.

3.1.2.3 ONR Regional Offices

The mission of the ONR regional offices is to plan and exercise management control over the quality, responsiveness, and proper administration of contracts, grants and other assistance agreements at educational institutions and non-profit organizations for ONR, DON, DoD, and other Federal Agencies.

Each of the 5 regional offices has the following labor categories, which vary in number:

Regional Director/Supervisory Contract Specialist	GS-1102-14
Contracts Specialists	GS-1102-12
Grants Specialists	GS-1101-09
Procurement Technicians	GS-1106-07
Administrative Support	GS-0303-07

Personnel at the regional offices are assigned to support an educational institution or non-profit for a maximum of three years. At the end of the three years, personnel are rotated to a different institution to avoid the appearance of, or potential for, conflicts of interest.

3.1.3 Current University Business Affairs Functions

The Figure 3-2 below describes functions and sub-functions performed by the ONR Regional Offices as they relate to university business affairs.

FUNCTION	SUBFUNCTIONS
Process Payment Requests	• Use both EDI and manual means to certify payment of vouchers • Work with universities to correct errors in voucher submissions
Negotiate Indirect Cost Rates	• Establish rates (predetermined, fixed with carry forward, final or provisional) at assigned Universities
Closeout Contracts and Grants	• Solicit awardee for required deliverables and forms • Counsel awardee about the closeout process • Ensure awardee submittals meet the administrative requirements of the terms and conditions of the grant • Contact program management for formal acceptance of deliverables or facilitate necessary changes to the deliverable • Complete relevant forms, certifications, releases, review and acceptance of final cost for final closeout
Resolution of Audit Findings	• Determine allowability of direct and indirect costs • Determine appropriate cost classifications or allocation methodologies • Make determinations on Cost Accounting Standards adequacy or non-compliance, and equitable adjustments • Resolve questioned deficiencies relative to system reviews • Provide guidance/direction to institutions or auditors on implementation of applicable Cost Accounting Standards
Educate/Train University Personnel	• Advise universities regarding grant and contract terms and conditions • Provide guidance regarding OMB Circular A-110; Property issues, e.g., title, inventory, and disposal; Standards for purchasing/procurement/ property systems reviews; and grants and assistance policy
Track Funds Expenditures	• Track expenditures of universities • Alert program officials of low expenditure rates • Alert placement offices to cash management deficiencies • Support DoD participation in Government- wide efforts to reform university payment processes
Support Program Management	• Provide support to program managers for administrative issues • Award incremental funding, no cost funds extensions, and other administrative modifications • Provide periodic reporting regarding expenditures
Administer Property	• Provide guidance on disposition of property • Provide inventory management • Provide title management

Figure 3-2 ONR Regional Office Functions and Sub-functions

3.1.4 Changes in Operations Over Last 10 Years

In an attempt to become more effective in response to Government mandates for staff reduction and streamlined processes, ONR began reengineering their processes and procedures for conducting and administering Government research programs. ONR consolidated offices located on college campuses to regional offices, implemented a paperless acquisition process and streamlined administrative and business procedures.

3.1.4.1 Regionalization

In 1988, ONR began consolidating its field locations. Previously, ACOs were located on college campuses. This had been convenient when scientific research programs first came into being, but universities no longer needed such intense assistance on campus. Universities still benefit from the expertise provided by the field office located in their region.

These field offices were strategically established to evenly distribute universities among them. In addition to creating regional offices, the Field Administration Office and the Indirect Cost Branch were created and moved to ONR HQ. Figure 3-3 identifies the current locations of each regional office and its relationship to the previously maintained resident offices and ONR detachments. As a function of regionalization and application of a risk-based approach to G&CAS, which facilitated the regional restructuring, ONR has been able to close 11 offices, cut the workforce in half, and double its caseload (measured in terms of number of grants and contracts administered).

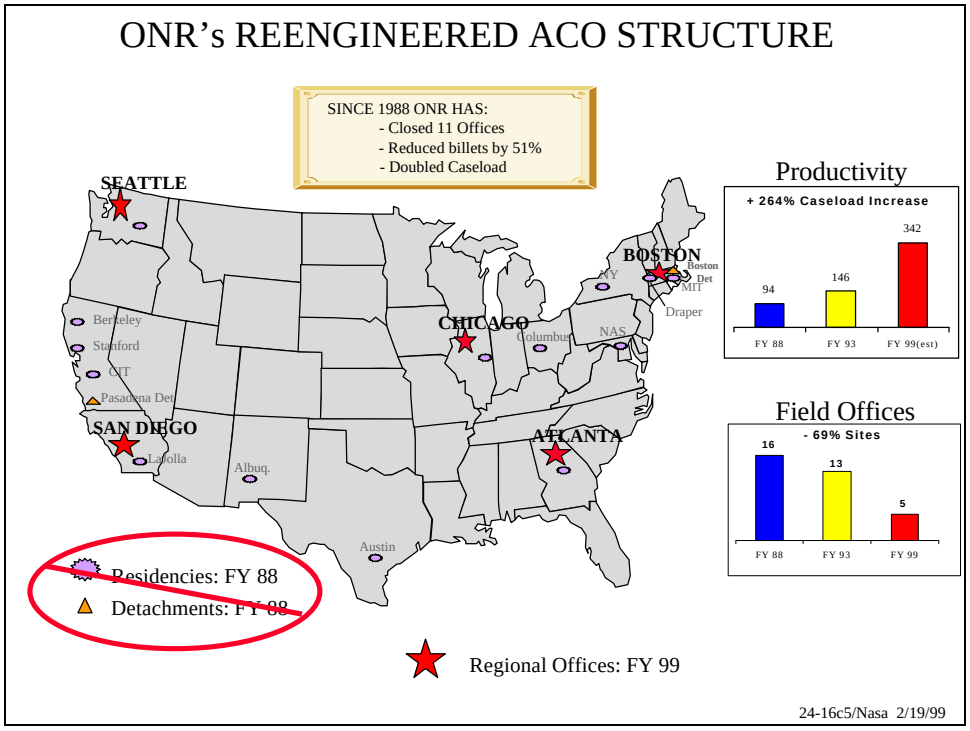


Figure 3-3 ONR Regional Office Structure

3.1.4.2 Paperless Acquisition Process

The Contract Administration Management Information System (CAMIS) was originally an ONR stand-alone system with terminals resident at ONR HQ and the ONR regional offices for purposes of contract administration. ONR added an expenditure-tracking model to CAMIS. Later, CAMIS was integrated into another ONR developed system, the Integrated Naval Research Information System (INRIS). INRIS became the backbone for business operations for ONR. In addition to CAMIS, INRIS includes the following modules:

- Science and Technology Module
- Financial Systems (including STARS)
- Corporate Operations Systems

Currently, the award and administration of grants and contracts is a combination of manual and electronic processes. The goal of ONR is to be paperless by the year 2000. They currently conduct 80% of their processes electronically.

To fulfill the paperless goal, ONR is pursuing an Electronic Data Interchange/Electronic Funds Transfer (EDI/EFT) system. ONR's EDI/EFT system was developed as a joint venture between ONR, Defense Finance and Accounting Service (DFAS), Massachusetts Institute of Technology (MIT) and the University of Southern California between 1989 and 1991. Since then, the system has processed thousands of invoices and hundreds of millions of dollars at universities and research non-profits. Three primary benefits have emerged due to the EDI/EFT system, which are:

1) Higher quality reviews of vouchers – the automated checks are performed on a 100% inspection basis vs. the typical sampling method used by necessity on manual vouchers. Since more than one review takes place, mistakes are rarely are missed.
2) Improved expenditure rates – ONR's experience has been that EDI/EFT paid awards have a 10 percentage point better expenditure rate at year's end to similar awards not paid using EDI/EFT.
3) Error reduction – because payment to obligation matching processes are automated, EDI/EFT eliminates unmatched disbursements and other problems.

3.1.4.3 Process Improvements

ONR has streamlined the administrative and business procedures for Federally sponsored research. ONR has achieved commonality in the following areas:

- Proposal forms
- Electronic proposal format
- Hardware, software, and Database Management Systems
- EDI/EFT standard processes and formats

A recent study evaluated the reduction of bureaucratic red tape at 28 academic institutions. Several streamlining benefits were noted. Normally, Principal Investigators at colleges and universities spend 10% to 20% of their time on administrative matters required by the conditions of federal sponsorship. Due to ONR's participation in Federal streamlining initiatives, the majority of the principle investigators surveyed reported spending 15% less time on administrative tasks.

3.2 Status Quo

For purposes of this study, the Status Quo scenario is defined as ONR retaining the administration of contracts and grants issued by ONR, entities within DoD to include the Army and Air Force, NASA, and other Federal agencies with educational and nonprofit institutions.

ONR has developed methods to administer grants, which are a combination of FAR Part 42.302, the DoDGARs Part 22, and unique business processes. In general, regional offices process payment requests, perform reviews of university business systems, assist in negotiating indirect cost rates at certain institutions, close out awards, and provide general assistance and information on business matters.

Currently, UBA has 81 staff. ONR has a specified target to reduce UBA staffing to 76 by 2001. Based on historical data and interviews with ONR, future reductions in G&CAS staff are projected at the rate of 3.5% per year. Accordingly, the total number of FTEs required to perform these functions will be approximately 55 by 2009 in the status quo.

3.3 Alternative CAS Scenarios

The Alternative scenario is defined as transferring the G&CAS functions from ONR to DCMC. Under this alternative, ONR G&CAS personnel would become DCMC employees and would physically relocate to a DCMC office. Booz·Allen interviewed DCMC officials on how contracts and grants would be administered with universities and nonprofit organizations under this alternative scenario.

The following assumptions were made regarding the transfer of G&CAS from ONR to DCMC:

- The total staff transferred from ONR is 73
- For the first year, people and functions would continue "as-is, where-is" under DCMC cognizance
- ONR will retain 3 FTEs from their HQ staff to perform UBA functions such as policy formulation, representation to boards and councils, and other project administration
- In years two through ten, a 10% reduction in new DCMC (i.e. the former ONR) personnel performing grants and contracts administration is assumed
- The first year of the transition, DCMC would conduct business as usual

3.4 Comparison of the Alternatives

For this comparison, we interviewed ONR personnel, as well as representatives of universities, customers (internal and external to ONR), OMB and DCMC. We determined the types of services ONR provides, their customer satisfaction, and the ramification of having G&CAS functions transferred to DCMC.

3.4.1 Quantitative Comparison of Alternatives

The quantitative comparison addresses the total cost of operations associated with the performance of G&CAS functions by ONR, i.e. the Status Quo, compared to the total cost of operations associated with the proposed alternative of delegating the G&CAS functions currently performed by ONR to DCMC. The Basis of Estimate for all costs identified, the complete cost summary for each alternative, and the monte carlo simulation are provided in Appendix F.

Total discounted costs for the status quo scenario for the ten year cycle are estimated at $43.0 million. For this scenario, the cost of training is included in the ONR burden rate. There are no investment costs. The only cost incurred is the cost of ONR personnel. ONR personnel costs were estimated by determining the number of FTEs that are funded out of the ONR budget, which includes the 23 reimbursable billets from NASA, multiplied by the ONR burden rate.

Total costs for the alternative scenario for the ten year cycle is estimated at $43.7 million. Investment cost for this alternative includes initial training of newly transferred DCMC employees and systems interface design. We estimated $244,000 for initial training, which was allocated across two fiscal years. We assumed that the newly transferred DCMC employees were already trained to perform their G&CAS functions, however, they may be required to participate in some DCMC-specific training. We also assumed that other training within the scope of the G&CAS function would be included in the DCMC burden rate.

We estimated $1 million for systems interface design. This takes into consideration the data conversion effort and the hardware or software interface cost to integrate CAMIS and the DCMC information systems. This figure was discussed with DCMC systems staff, who concurred that the interface costs could reasonably be $750,000 to $1.5 million.

The majority of the costs are captured in operations and support. The greatest costs were attributed to total personnel, estimated to be $6.7 million per year for the 73 FTEs transferred to DCMC and the 3 FTEs retained at ONR. For years 2002 through 2009, we assumed a 10% annual reduction of the DCMC staff. For risk analysis purposes, we assumed a range of FTE reductions from 0 – 20%. The rationale behind this assumption was to capture the natural attrition experienced at DCMC plus the anticipated efficiencies of the consolidation with DCMC. Subsequent to these calculations, DCMC advised that FTE reductions of 1 – 5% per year would be more realistic. We did not recalculate the cost based on this new information as it would make this alternative quantitatively less attractive and would not have altered the recommendation.

A comparison of the costs discussed above, and shown in Figure 3-4 reveals that maintaining the Status Quo is the most cost effective solution.

	Status Quo	**Alternative 0-1B**
Low	$43.0M	$34.7M
Most Likely	$43.0M	$43.7M
High	$43.0M	$58.0M

Figure 3-4 ONR Cost Comparison (10 year Investment and Operations)

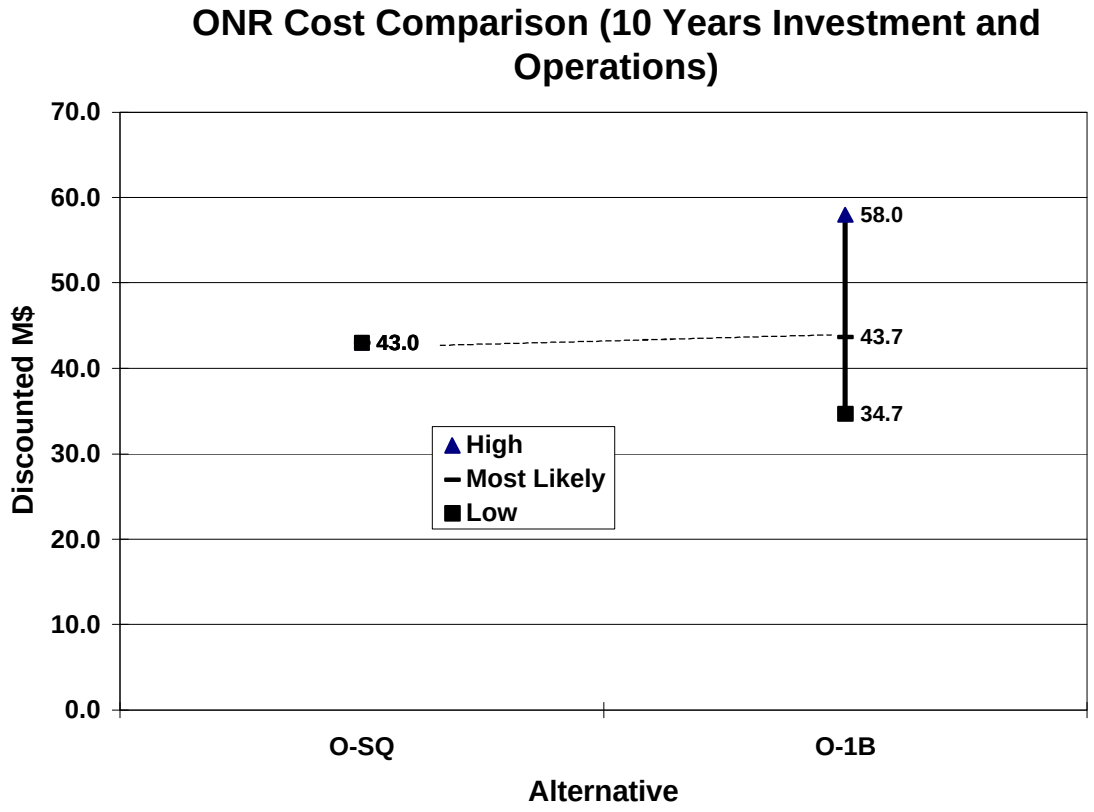


Figure 3-5 ONR Graphical Cost Comparison

3.4.2 Qualitative Comparison of Alternatives

We developed a set of qualitative factors to evaluate the effect of the alternative proposal on the performance of G&CAS functions for ONR. Section 1.4.3.5 describes these factors, the methodology used to incorporate them into the decision making process, and the application of the methodology to this study. This section describes the results of that qualitative comparison. The qualitative value of both scenarios was determined by evaluating each of the qualitative factors according to how well it was satisfied by either of the two alternatives.

The bar graph below depicts the overall results of evaluating the status quo against the alternative scenario for each of qualitative factors. These factors were evaluated with the long-term picture in mind, that is, we did not just consider the first year or two of the transition. Qualitatively, maintenance of the status quo is the preferred alternative. It was evaluated as over 40% more likely to satisfy the qualitative factors.

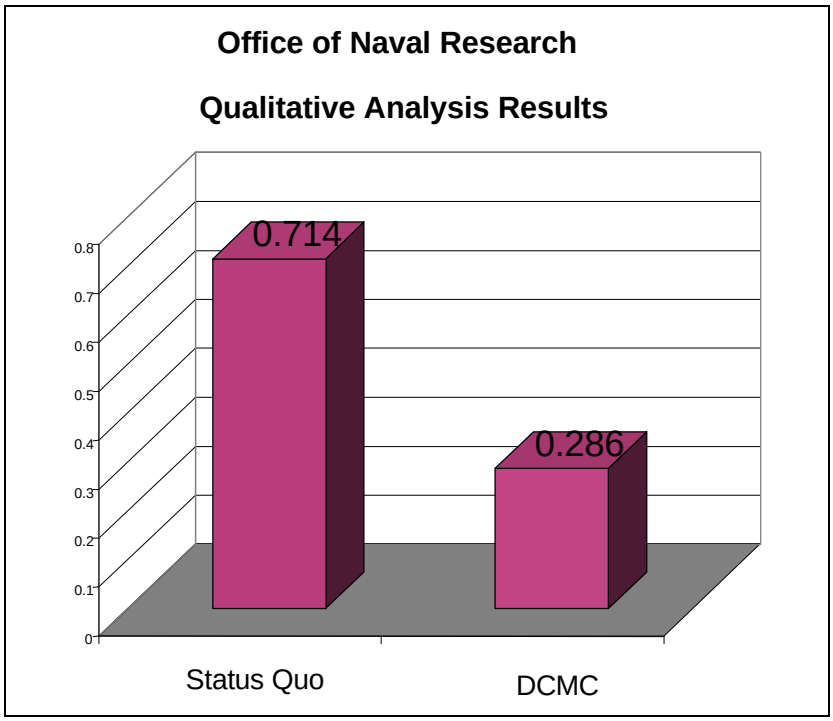


Figure 3-6 Qualitative Results

We considered nine factors in the qualitative evaluation, of which, the following three were collectively worth over 50% of the qualitative score: achievement of mission/objectives, subject matter expertise of G&CAS staff, and timeliness. On all three of these factors, the Status Quo was rated very highly.

The most heavily weighted qualitative factor is "achievement of mission objectives", weighted at 22% of the total qualitative score. The main objective of ONR's UBA Division is to establish and maintain effective business relationships between ONR and the university research community. The primary, but not sole, basis for interaction between UBA and the university is UBA's contract and grant administration function. The primary purpose of DoD research awards to universities is to perform research in areas that will continue to provide technological superiority in the future for the U.S. military. Consequently, ONR was scored highly on their ability to satisfy this criteria as ONR's involvement from origination to closeout of university research projects directly supports the overall ONR mission, namely:

- Encourage, promote, plan, initiate and coordinate naval research
- Assist with the research and development conducted by ONR and other offices and agencies
- Supervise, administer, and control activities within, or for, the DON relating to patents, inventions, trademarks, copyrights, royalties and matters relating to naval research

ONR has developed their subject matter expertise in grants administration for universities and non-profit organizations from decades of support to this focused community. Their execution of grants and contract administration functions is largely transparent to the performers and customers, oftentimes because ONR provides more than purely G&CAS. Services the ONR

regional representatives provide to their customers beyond the scope of grants and contract administration include:

- Facilitating and integrating EDI/EFT into current business processes
- Training of university staff in grants and assistance policy and administration
- Assisting universities in resolving audit findings
- Tracking funds expenditure rates
- Participating in policy formulation and maintenance which is specific to university and nonprofit organizations
- Assisting customers in overall project management

ONR regional representatives knowledge and expertise and on-going experiences are fed back into the rest of ONR to strengthen the overall ONR understanding and expertise with regard to university research. This constant communication process between the field and the Headquarters strengthens ONR in their leadership role in the university community, such as, providing the Government representative on the Federal Demonstration Partnership Board and the Chair of the Terms and Conditions Subcommittee.

ONR was rated very highly by their customers, as well as the research community, in their timeliness. ONR's focus on the university community and UBA's dedication of a particular regional representative to a specific university facilitates their responsiveness, which we defined as a subset of timeliness. Based on current experience, customers and university representatives felt strongly that the small streamlined staff at ONR helps eliminate bureaucratic bottlenecks that might otherwise cause unnecessary delays in decision making. Customers and performers are able to access ONR staff at a higher level in the organization and get issue resolution faster at ONR than is typically experienced in other organizations.

All parties contacted agreed that DCMC would have the capability to perform these G&CAS functions, especially with the transfer of ONR staff. However, ONR customers and university performers feared that, without changes to DCMC's current methods of operation, the university R&D projects would “get lost” at DCMC. The comparatively low dollar value of the research contracts and grants would relegate many of them to DCMC’s automated processes with a dramatic reduction in access to staff to help resolve issues and handle problems. While the G&CAS functions would be performed effectively at DCMC, the level of service, including non-G&CAS functions, that customers and performers are receiving from ONR today would be diminished. Of particular concern is the long-term effect on the university basic research program. It is believed that the university research program is out of the mainstream of DCMC business and comparatively insignificant to warrant the time and focus that the community receives from ONR today. With more of the burden falling on the performers, an increase in the percentage of dollars applied to basic research would be diverted to administration and away from research.

ONR estimated that a minimum of four FTEs at ONR headquarters, for a total of seven (7) ONR UBA staff, would approximate the level of service provided today, should G&CAS be delegated to DCMC. The 10 year discounted cost of this alternative was estimated to be $53.9 million. This was not offered as an alternative since a more expensive alternative with additional staff was not considered a viable alternative.

3.5 Recommendation

The 10-year discounted costs associated with the Status Quo ($43.0 million) and Alternative 0-1A are extremely close ($43.7 million). The ranges of costs indicate that Alternative 0-1A might be more cost effective on the "low-end" ($34.7 million). In such a close cost picture, we look to the qualitative analysis to determine the superior alternative. The qualitative analysis discussed above indicates a clear preference for maintaining the status quo, leaving administration of university grants and contracts with ONR.

4 Army Ammunition Plants

4.1 Mission and Background

The Army is the Single Manager for Conventional Ammunition for the Department of Defense. Under the overall command and control provided by U.S. Army Industrial Operations Command (IOC), a subordinate organization of the U.S. Army Material Command, the Government-Owned, Contractor-Operated (GOCO) Army Ammunition Plants (AAP) produce a variety of ammunition and ammunition products for use by Federal government personnel.

Seven active plants produce various completed and intermediate products including small and large caliber ammunition, mortar and artillery rounds, gunpowder, pyrotechnics, and high-power explosives. There are fourteen "inactive" plants that can best be described as follows:

- Four Army Reserve Plants capable of rapid reconstitution to meet mobilization surge
- Three inactive stand-by plants that, if needed, can be reconstituted
- Two excess plants that are no longer needed (Joliet and Alabama)
- Five excess plants that are no longer needed but require ongoing environmental remediation

Both active and inactive plants continue to be challenged by environmental remediation and demilitarization requirements. Many of these challenges will require as many as 20 years for full resolution.

The Armament Retooling and Manufacturing Support (ARMS) act passed by Congress in 1992 allows businesses to use "idle" capacity and capability at AAPs including land, buildings, equipment, utilities, communications, and transportation. Fifteen active and inactive plants have ongoing ARMS initiatives.

The 19 plants, excepting the two that are excess, are located in seventeen states with primary geographic concentration in the eastern and central United States. Twelve different contractors operate production facilities at these 19 active and inactive sites. Two sites, the Joliet AAP at Joliet, IL and the Alabama AAP at Childersburg, AL have no present ammunition-related/land management contractor operations. Additionally, the Alabama AAP was declared excess as part of the 1989 Base Realignment and Closure Commission recommendations. Refer to Appendix G, Tables G-1a and b, for a complete description of the active and inactive AAPs.

The IOC GOCO AAPs are military installations/activities under the jurisdiction of the IOC Commanding General. In this regard, the AAP commanders and commander's representatives are responsible for performing, or requiring to be performed, various contract administration services (CAS). The authority to execute this responsibility is evidenced by formal delegation from an IOC Contracting Officer to act as a contracting officer's representative (COR) or as an administrative contracting officer (ACO) as stated in IOC regulations[5].

[5] The IOC Regulation 10-8, Organization and Functions, Active Army Ammunition Plants, 20 Jun 1997 and IOC Regulation 10-9, Organization and Functions, Inactive and Excess Army Ammunition Plants, 3 Jul 1997

4.1.1 AAP Staffing

Organizationally, Army officers command active plants while Department of the Army Civilian (DAC) commander's representatives manage inactive plants. Staff size ranges from 22-30 military and civilian personnel at the active plants and from three to fourteen DACs at inactive plants. Organizational structure at the individual active plants is primarily functional in design (e.g., contract administration, safety, engineering, transportation, quality assurance, etc.). The structure at the inactive plants is less well defined due to a variety of special circumstances (e.g., designation of the plant as an Army Reserve Plant, standby inactive plant, or excess to IOC).

Operationally, staffing at active plants primarily consists of two military personnel (a commander and an executive officer) who provide overall command and control and DAC staff who, generally, perform single functional responsibilities. Staffing at inactive plants consists of a DAC commander's representative who provides command and control and DAC staff who often perform multiple functional responsibilities. Individual inactive plants' DACs typically perform multiple duties such as safety and security or quality assurance and transportation management. Additionally, highly specialized positions, such as agronomists, are shared across nearby plants. Whether positions are designated as multiple functional type or shared type, the AAPs are achieving their operational staffing goals. Note that this "multi-tasking" of DACs at inactive plants relates more to reduced/cessation of production and concomitant position attrition than by intentional design. Operational staffing at inactive plants is more a matter of "achieving adequate coverage of the work" within existing resources. The U.S. Army Industrial Operations Command (IOC), Rock Island, IL delegates performance of CAS to plant commanders and Government representatives.

While the individual active and inactive plants perform day-to-day contract administration, the IOC provides formal contracting office support for the AAPs. Procuring Contracting Officers (PCO) at the IOC execute contract modifications and perform official contracting officer functions. The CAS[6] needs are typically identified by the individual AAP staffs and are communicated to the IOC staff for formal action. Due to the proximity of the AAP staffs to the contractor, regular interaction between the AAPs and IOC is necessary to resolve issues in a timely manner.

4.1.2 Recent Downsizing

Since 1993, IOC has identified and implemented downsizing projects that have reduced ammunition plant maintenance requirements and costs including:

- Decontaminating and selling excess equipment
- Removing sensitive items
- Documenting excess real property
- Deactivating utilities
- Removing asbestos
- Consolidating activities
- Closing buildings

[6] These CAS functions are typical of those described in the FAR Part 42, Contract Administration and Audit Services.

Additionally, plant maintenance costs have been reduced by streamlining maintenance requirements and by negotiating contracts more rigorously. The IOC has increased the number of technical staff members who evaluate and annually negotiate maintenance contracts. This often results in reduced costs by negotiating reductions in the number of contractor personnel.

4.1.3 Acquisition Reforms

At present, the Department of the Army's acquisition strategy and choice of contract type for ammunition production is transitioning from Cost Plus (CP) to Firm-Fixed Price (FFP). Much of this transition is due to an acquisition reform imperative that articulates, "The private sector, today, can reasonably and adequately perform to specified levels of quality and timeliness without the need for additional incentive." While acquisition reform is attempting to achieve more streamlined processes at the PCO level, it is unclear as to the impact at the ACO level. Additionally, under FFP contracts, formal contract modifications will be required for any change in scope of work. Hence, it is anticipated that overall AAP CAS workload could actually increase, over time, as FFP replaces CP contracts.

4.2 Definition of the Status Quo CAS Operations Performed at the AAPs

4.2.1 The Active AAPs

Functionally, active AAP military and civilian personnel provide a range of post-contract award CAS, contractor production and landowner management oversight at the several AAPs. A review of FAR Part 42 indicates that while some of the AAP staff functions are readily identifiable as CAS, others lie outside the scope of CAS as defined by the FAR. According to the official IOC mission and functions document[7], the active AAPs perform installation management and contract administration over a contractor operated installation. Hence, many of the functions performed by the Government staff are either directly or indirectly related to the performance of CAS.

Figure 4-1 describes functions and subfunctions performed by the active AAPs Government staff related to FAR Part 42, Contract Administration and Audit Services.

[7] The IOC Regulation 10-8, Organization and Functions, Active Army Ammunition Plants, 20 Jun 1997

FUNCTION	SUBFUNCTIONS RELATED TO FAR 42
Contract administration and financial support	• Cost and price analysis • Contract audit • Review of cost based proposals • Contract modification • Negotiation • Purchasing review • Statement of Work review • Technical evaluation • Labor relations
Equipment management	• Oversight of contractor equipment utilization • Oversight of equipment planning and disposal
Traffic management	• Shipment planning and GBL reviews and reports • Contractor technical assistance • DOT Law Review • Demurrage/detention tracking and payment program • Demilitarization (field service planning and reporting) • Container control • Contractor traffic office/depot evaluation • Carrier performance program review
Quality	• Product acceptance documentation • Program/process/product audit • Corrective action • Technical evaluation

Figure 4-1 Active Plants' FAR Part 42 Functions/Subfunctions

4.2.2 The Inactive AAPs

Of the 14 inactive plants[8], four are Army Reserve Plants, three are inactive standby facilities, and seven are considered as excess to IOC's needs. The primary distinction between the Army Reserve Plants and the inactive standby facilities is that Reserve Plants retain most production equipment while standby plants, typically, do not. If needed, standby plants retain the ability to be reconstituted for production with the installation of production equipment. Both types of these inactive plants have contracts to maintain equipment and facilities, preserve production capability, and perform caretaker operations. The CAS functions performed at the seven excess sites are primarily limited to environmental remediation. A review of FAR Part 42 indicates that while some of these functions are readily identifiable as CAS, others lie outside the scope of CAS. According to official IOC mission and functions documents[9], the inactive AAPs perform installation management and contract administration over, generally, a contractor operated installation. Consequently, many of the functions performed by the Government staff are either directly or indirectly related to the performance of CAS, but also include program management and installation management functions.

To minimize the ownership costs of these plants, IOC has facility use contracts in place at some of the inactive plants that allow contractors to obtain DoD and non-DoD production orders,

[8] Two of the 14 plants, Longhorn and Louisiana, are administratively combined.
[9] The IOC Regulation 10-9, Organization and Functions, Inactive and Excess Army Ammunition Plants, 3 Jul 1997

competitively, and produce at the plants under third-party contract arrangements. These third party arrangements are summarized in Table G-2 in Appendix G. Third party contract arrangements help offset the cost of the Government overhead associated with the maintenance of the facilities.

Figure 4-2 describes functions and subfunctions performed at the inactive plants by the AAP Government staff related to FAR Part 42, Contract Administration and Audit Services:

FUNCTION	SUBFUNCTIONS RELATED TO FAR 42
Contract administration	• Cost and price analysis • Contract audit • Review of cost based proposals • Contract modification • Negotiation • Purchasing review • Statement of Work review • Technical evaluation • Labor relations
Equipment management and disposal	• Oversight of contractor equipment utilization • Oversight of equipment planning and disposal
Production oversight and product acceptance	• Product acceptance documentation • Program/process/product audit • Corrective action • Technical evaluation
Surveillance of stored materials	• Monitor storage operations • Corrective action • Technical evaluation
Transportation and traffic management	• Shipment planning and GBL reviews and reports • Contractor technical assistance • DOT Law Review • Demurrage/detention tracking and payment program • Demilitarization (field service planning and reporting) • Container control • Contractor traffic office/depot evaluation • Carrier performance program review

Figure 4-2 Inactive Plants' FAR Part 42 Functions/Subfunctions

4.3 Comparison of the Alternatives

4.3.1 Issues, Assumptions, and Constraints

After a series of formal discussions with IOC and DCMC staffs, the following general assumptions were developed:

- Any actual transfer of function will require a “site-by-site” examination of unique product and service attributes.
- If required, IOC and DCMC will mutually determine disposition and control over Quality Assurance Specialist (Ammunition Surveillance) (QASAS) positions. These

positions are controlled by the U.S. Army Defense Ammunition Center & Schools, McAlester Army Depot, OK under the IOC[10].

- The CAS activities that both DCMC and IOC agreed were purely CAS and were delegable are: contract administration, equipment management, production oversight, traffic management, facility management, and quality assurance. Of these activities, equipment management and quality assurance had to remain on-site even if CAS were transferred to DCMC.

Major issues and concerns expressed by IOC and AAP staffs regarding the delegation of CAS to the DCMC include:

- Responsiveness/proximity of CAS staff to the AAPs
- Maintenance of effective command and control (C2) and communications
- Retention of authority to perform limited negotiation. The IOC determined that it desires to retain all authority for pre-formal negotiation authority in the event of transfer of CAS to DCMC.
- Allocation, training, and career management of QASAS personnel
- Potentially increased IOC staffing/funding requirements upon delegation of CAS to DCMC
- Many of the inactive plants employ very few CAS personnel. Of these personnel, many are "multi-hatted." As such, if their CAS duties were delegated, someone would still have to fill a non-CAS role, resulting in potential increased staff.

Discussions with DCMC reveal the following information in light of the IOC/AAP's concerns:

- The DCMC is willing to assume delegated CAS functions based on an "As is/Where is" condition in terms of maintaining continuity of operations. This, however, may include the requirement to service the AAPs via mobile teams if needed.
- The full understanding that IOC reserves the right and will maintain the authority to direct DCMC CAS actions through formal Memoranda of Instruction. This partially addresses the IOC/AAP concern regarding maintenance of effective command and control (C2) and communications
- That any pre-formal (or informal) negotiation authority will remain the domain of the AAP's commanders or commanders' representatives
- The DCMC will attempt to maintain QASAS positions' continuous onsite AAP presence and comply with Army Career Program (CP)-20, Quality Assurance Specialist (Ammunition Surveillance) requirements
- The DCMC is sensitive to the Army's position that any delegation of CAS to DCMC should not increase the Army's staffing/funding requirements

4.3.2 Quantitative Comparison

The Booz·Allen team conducted a cost comparison of four alternatives, which present a range of outcomes, for the seven active and five inactive plants with a continuing future mission. The cost estimates cover a 10-year investment and operations period. These four alternatives are:

[10] The U.S. Army Defense Ammunition Center & Schools (USADACS) is the Army's Career Program manager for QASAS.

- Alternative **A-SQ** (Status Quo)--The CAS functions and personnel remain the responsibility of the AAPs.
- Alternative **A-1A**--All CAS functions and personnel transfer to DCMC with personnel remaining at the AAPs.
- Alternative **A-1B**--All CAS functions and personnel transfer to DCMC with all CAS personnel who can work remotely moving to DCMC Contract Administration Offices (CAO).
- Alternative **A-2**--Partial CAS functions and personnel transfer to DCMC CAOs with partial CAS functions and personnel retained by the AAPs.

The team collected all necessary cost data to verify co-equal treatment and comparison of the four alternatives. The comparison considered the following cost categories:

- **Investment Costs**
  - Training
  - Systems Interface Design
- **Operations and Support Costs**
  - Recurring Training
  - DCMC Personnel (Additional for Active Plants)
  - DCMC Personnel (Additional for Inactive Plants)
  - AAP CAS Personnel (Active Plants)
  - AAP CAS Personnel (Inactive Plants)

The Basis of Estimate for these costs, the complete cost summary for each alternative and the monte carlo simulation are provided in Appendix H.

4.3.2.1 Alternative A-SQ– Costs

Alternative A-SQ captures the costs associated with continuing the existing operations. As such, the only cost elements under this alternative are the AAP CAS Personnel (Active) and AAP CAS Personnel (Inactive). Figures 4-3 and 4-4 identify the CAS FTEs by facility included in this analysis.

Active Plant	Status Quo: CAS AAP FTEs at AAP
Lone Star	8.0
Radford	15.8
Holston	9.0
Milan	13.7
Iowa	16.0
Lake City	14.0
Hawthorne	5.0
Total	**81.4***

Figure 4-3 Status Quo: Total CAS Full-Time Equivalent (FTE) – Active Plants

* Indicates number has been rounded

Inactive Plant	Status Quo: CAS AAP FTEs at AAP
Kansas	1.3
Longhorn/ Louisiana	1.2
Mississippi	0.0
Riverbank	0.0
Scranton	2.4
Total	**4.9**

Figure 4-4 Status Quo: Total CAS FTEs – Inactive Plants

The active plant CAS personnel costs are approximately $6.2 million per year and the inactive plant CAS personnel costs are approximately $375,000 per year. For comparative purposes, the 10-year discounted cost for this alternative equals $54.3 million.

4.3.2.2 Alternative A-1A Costs

In Alternative A-1A, the CAS personnel "switch hats" and become DCMC employees. Unlike the status quo, there are investment costs with this alternative. We captured both interface costs to connect existing AAP CAS information systems with DCMC's systems and training costs to address any initial training for the former AAP employees to become cognizant of DCMC policies and procedures.

Compared with the Status Quo, recurring costs are also captured in different categories. Originally, these costs were in the AAP CAS Personnel category, but now they are in the DCMC CAS Personnel category as shown in Figures 4-5 and 4-6. The number of staff increases slightly to round up to full positions, so costs increase slightly compared to the status quo. A higher DCMC burden rate[11] contributes to higher costs as well.

Active Plant	Alt A-1A New DCMC FTEs at AAP
Lone Star	8.0
Radford	16.0
Holston	9.0
Milan	14.0
Iowa	16.0
Lake City	14.0
Hawthorne	5.0
Total	**82.0**

Figure 4-5 Alt A-1A: Distribution of Total CAS FTEs – Active Plants

[11] The burden rate considers administrative overhead, personnel fringe benefits, etc.

Inactive Plant	Alt A-1A New DCMC FTEs at AAP
Kansas	2.0
Longhorn/ Louisiana	2.0
Mississippi	0.0
Riverbank	0.0
Scranton	3.0
Total	**7.0**

Figure 4-6 Alt A-1A: Distribution of Total CAS FTEs – Inactive Plants

The active plant DCMC Personnel costs are $6.7 million per year and the inactive plant DCMC Personnel costs are $576,000 per year. For comparative purposes, the 10-year discounted cost for this alternative equals $61.4 million.

4.3.2.3 Alternative A-1B Costs

In Alternative A-1B, the CAS personnel not only "switch hats" and become DCMC employees, but also relocate to a DCMC CAO. Like Alternative A-1A, there are investment costs in this alternative. We captured both interface costs to connect existing CAS information systems and training costs to address any initial training for the former AAP employees. The recurring costs are captured in the same categories as Alternative A-1A; all positions are captured in the DCMC CAS Personnel Category. The number of staff distributed in different geographic locations is based on whether their activities can be relocated.

As shown in Figure 4-7, 47 new DCMC FTEs remained at the active AAPs. However, 37 FTEs could physically relocate to a CAO. Like Alternative A-1A, the number of DCMC staff that physically remain at the AAPs was "rounded up" to whole numbers. However, the DCMC FTEs who relocate to the CAOs do not have to be rounded because they are now co-located and the sharing of duties with existing DCMC staff is feasible.

If the AAP CAS personnel are relocated to a CAO, DCMC would eventually "draw down" the AAP unique CAS staffing consistent with past operations at the AAPs. Over time, AAP-related CAS will be performed by other DCMC staff at the CAO. Based upon discussions with DCMC, a 10 percent annual reduction in CAS FTEs may be possible after 2001. For risk analysis purposes, we assumed that 20 percent is the highest reduction rate and 0 percent is the lowest. Subsequent to these calculations, DCMC advised that a 1 – 5% annual rate of FTE reduction was more realistic. We did not recalculate the cost of this alternative with this new data since the result would be an increase in cost of this alternative and would have no impact on our recommendation.

The rationale behind the assumption of reduced staffing is to capture economies of scale associated with the phase-out of AAP unique CAS FTEs at CAOs. Since consolidation with DCMC should allow some professional efficiency (e.g., centralized training, centralized processes, etc.), we believe that some of these 37 FTEs could be absorbed into existing operations. The Qualitative Section addresses any expected impacts on quality.

Active Plant	Alt A-1B New DCMC FTEs at AAP	Alt A-1B: New DCMC FTEs at CAO
Lone Star	4.0	4.0
Radford	10.0	6.0
Holston	3.0	6.5
Milan	10.0	4.6
Iowa	9.0	7.0
Lake City	11.0	4.0
Hawthorne	0.0	5.0
Total	47.0	37.0*
	Total Alt A-1B	**FTES: 84.0**

Figure 4-7 Alt A-1B: Distribution of CAS FTEs – Active Plants

Like the active plants, some of the inactive AAP CAS personnel become DCMC personnel and physically relocate to DCMC CAOs. We first isolated the CAS personnel into two categories: DCMC personnel that would relocate, and personnel that would not. We reviewed each plant on a case-by-case basis and determined that slightly more than 50 percent (4.3 FTEs) could relocate to a DCMC CAO. The other staff would remain at the AAP. According to the IOC and staff at the inactive plants, only the equipment management function must stay at the plant.

As shown in Figure 4-8, 4.0 new DCMC FTEs had to stay at the AAPs. However, 4.3 FTEs could physically relocate to a CAO. Like Alternative A-1A, the number of DCMC staff that physically remain at the AAPs was "rounded up" to whole numbers. However, the DCMC staff that relocate to the CAOs do not have to be rounded because they are now co-located and the sharing of duties with other DCMC staff is feasible.

Like the active plants, a 10 percent annual reduction in CAS FTEs may be possible after 2001. For risk analysis purposes, we assumed that 20 percent is the highest reduction rate and 0 percent is the lowest. Again, subsequent to these calculations, DCMC advised that a 1 – 5% annual FTE reduction was more realistic. We did not recalculate this alternative as the outcome would not change our recommendation.

Inactive Plant	Alt A-1B New DCMC FTEs at AAP	Alt A-1B: New DCMC FTEs at CAO
Kansas	1.0	1.1
Longhorn/ Louisiana	2.0	0.9
Mississippi	0.0	0.0
Riverbank	0.0	0.0
Scranton	1.0	2.2
Total	4.0	4.3*
	Total Alt A-1B	**FTEs: 8.3**

* indicates number has been rounded

Figure 4-8 Alt A-1B: Distribution of CAS FTEs – Inactive Plants

4.3.2.4 Alternative A-2 Costs

Alternative A-2, similarly segregates CAS positions into those which must remain at the AAP and those which can be remote. However, this alternative assumes that those CAS functions which must remain at the plant would continue to be filled by AAP employees.

Some of the active plant AAP CAS personnel become DCMC personnel and physically relocate, so we first isolated the CAS personnel into two categories: Those that had to remain at the plant, and those that did not. Most of these staff (except for two) were completely assigned (100%) to a unique CAS function. As such, they were easily separated into staff who could relocate to a CAO and those who had to remain at the AAP. According to the IOC and the staff at the active plants, the equipment management function and the QA function must stay at the plant.

As in Figure 4-9, 45 CAS FTEs remained Army employees and stayed at the AAPs. However, 37 FTEs could physically relocate to a CAO. Like the Status Quo, the Army staff who stay at the AAPs could easily continue to allocate their time across CAS and non-CAS functions, so the numbers of staff do not need to be rounded to whole numbers. Similarly, the DCMC staff who relocate to the CAOs do not have to be rounded because they are co-located with other DCMC staff and the sharing of their duties is feasible.

If the CAS FTEs are relocated to a CAO, DCMC would eventually “draw down” the AAP unique CAS staffing consistent with past operations at AAPs. Over time, related CAS functions will be performed by other DCMC staff at the CAOs. Based on discussions with DCMC, a 10 percent annual reduction in CAS FTEs may be possible after 2001. For risk analysis purposes, we assumed that 20 percent is the highest reduction rate and 0 percent is the lowest. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (37).

The rationale behind this assumption to reduce is to capture economies of scale associated with the phase-out of AAP unique CAS FTEs at CAOs. Since consolidation with DCMC should allow some professional efficiency (e.g., centralized training, centralized processes, etc.), we believe that some of these 37 FTEs could be absorbed into existing operations. See the Qualitative Section for expected impacts on quality. We did not recalculate the cost of this alternative with DCMC's subsequently recommended 1 – 5% annual FTE reduction. The effect of that change would be to make this alternative less attractive and would not change our recommendation.

Active Plant	Alt A-2: AAP FTEs at AAP	Alt A-2: New DCMC FTEs at CAO
Lone Star	4.0	4.0
Radford	10.0	6.0
Holston	2.5	6.5
Milan	9.4	4.6
Iowa	9.0	7.0
Lake City	10.0	4.0
Hawthorne	0.0	5.0
Total	**45***	**37***
	Total Alt A-2	**FTEs:82**

Figure 4-9 Alternative A-2: Distribution of CAS FTEs – Active Plants

Like the active plants, some of the inactive plant AAP CAS personnel become DCMC personnel and physically relocate to CAOs, so we first isolated the CAS personnel into two categories: Positions that could relocate and those that could not. We reviewed each plant on a case-by-case basis and determined that slightly less than 50 percent (4.3 FTEs) could relocate to a CAO. The remaining FTEs would stay at the AAPs. According to the IOC and the inactive plants' staff, only the equipment management function must stay at the plant.

As shown in Figure 4-10, 4.0 FTE remain with the Army while 4.3 FTE could physically relocate to a CAO. Like the Status Quo, the Army staff who stay at the AAPs could easily continue to allocate their time across CAS and non-CAS functions, so the staff in those positions do not need to be rounded to whole numbers. Similarly, the DCMC staff who relocate to the CAOs do not have to be rounded because they are co-located and the sharing of duties is feasible.

Like the active plants, a 10 percent annual reduction in CAS FTEs may be possible after 2001. For risk analysis purposes, we assumed that 20 percent is the highest reduction rate and 0 percent is the lowest. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (4.3).

Inactive Plant	Alt A-2: AAP FTEs at AAP	Alt A-2: New DCMC FTEs at CAO
Kansas	0.9	1.1
Longhorn/ Louisiana	1.1	0.9
Mississippi	0.0	0.0
Riverbank	0.0	0.0
Scranton	0.8	2.2
Total	2.8	4.3
	Total Alt A-2	**FTEs: 7.0**

Figure 4-10 Alternative A-2: Distribution CAS FTEs-- Inactive Plants

* indicates number has been rounded

Figure 4-11 summarizes the total costs for the four alternatives over a 10-year period.

EXPECTATION	STATUS QUO	ALT A-1A	ALT A-1B	ALT A-2
Low	$48.7	$54.6	$47.0	$43.0
Most Likely	**$54.3**	**$61.4**	**$56.5**	**$51.7**
High	$65.4	$70.2	$70.1	$66.0

Figure 4-11 The AAP Cost Comparison (10-Year Investment and Operations in Millions)

A graphic comparison of the four alternatives' 10 year investment and operations cost shows:

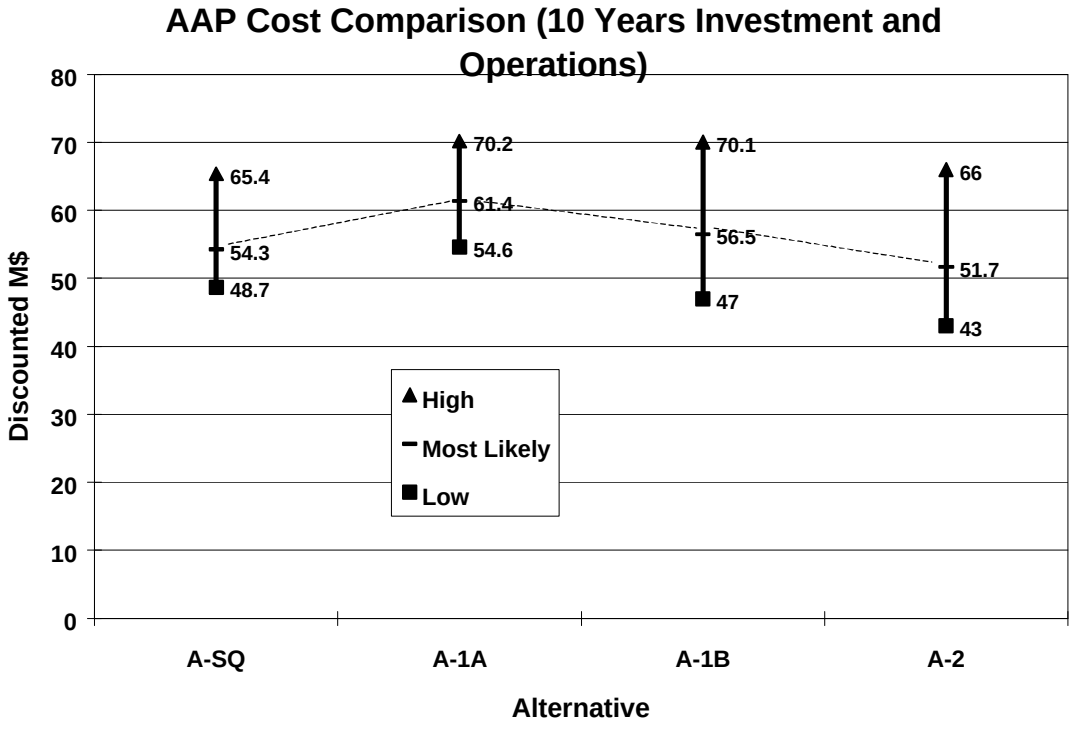


Figure 4-12 AAP Cost Comparison (10-Year Investment and Operations)

4.3.3 Qualitative Comparison

The Booz·Allen team developed a set of qualitative factors to evaluate the alternative scenarios of CAS performance. Section 1.4.3.5, above, describes these factors, the methodology used to incorporate these factors into the decision making process, and the application of the methodology to this study. The relative preference of any of the alternative scenarios was determined by evaluating how well that alternative satisfied each of the qualitative factors. This section describes the results of the qualitative comparison for the proposed CAS AAP alternatives. The evaluation criteria and their weights are:

RANK	EVALUATION CRITERIA	WEIGHT
1	Achievement of mission objectives / impact on military readiness	22%
2	Subject Matter Expertise of CAS Staff	18%
3	Timeliness	16%
4	Ability to recruit, assign, develop and retain CAS staff	12%
5	Synergy with the Non-CAS functions	10%
6	One Face to industry (Performer)	9%
7	Independence of the CAS function	5%
8	One face to the customer	4%
9	Expedience of adopting/implementing acquisition/CAS reforms	4%

Figure 4-13 Rankings of Qualitative Factors

Figure 4-14 shows the relative ratings of the four AAP alternative scenarios evaluated against the qualitative factors. The outcomes of these qualitative comparisons are also depicted in the bar chart below.

ALTERNATIVE	A-SQ	A-1A	A-1B	A-2	TOTAL
Relative Score	.310	.249	.171	.269	0.999/**1.000**

Figure 4-14 The AAP Alternatives Qualitative Scores

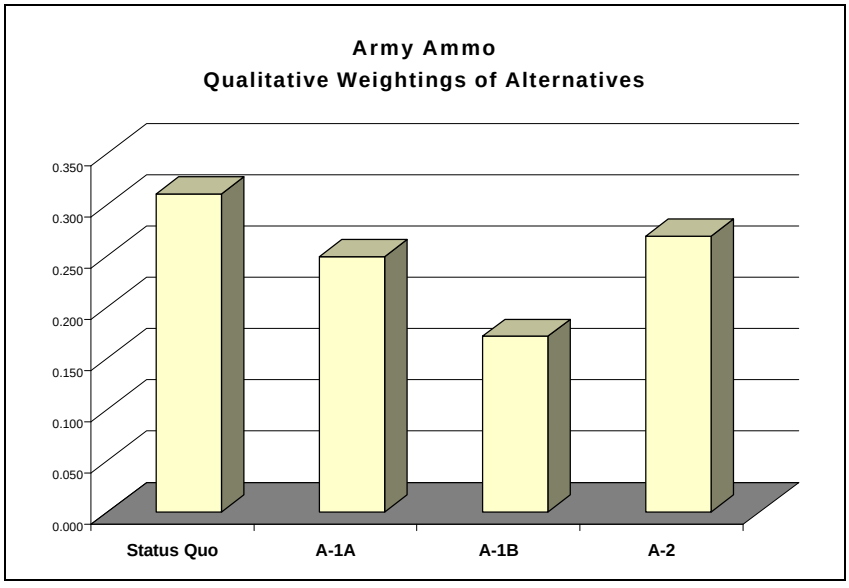


Figure 4-15 The AAP Alternatives Qualitative Ratings

The results indicate that achievement of the nine qualitative factors would be best achieved by maintaining the status quo (alternative A-SQ).

4.4 Recommendation

The ten-year costs associated with Alternative A-2 ($51.7 million) and Alternative A-SQ ($54.3 million) are extremely close. Even the ranges of costs provide conflicting results (Status Quo is better on the "high end" while A-2 is better on the "low end"). Thus, we used the qualitative analysis to make a decision to determine the superior alternative.

Ranking the qualitative scores, as described in Section 4.3.3, indicates a preference for Alternative A-SQ. Therefore Booz·Allen recommends maintaining the status quo, leaving the CAS responsibility with the Army. There is also a significantly lower cost risk associated with selecting the status quo as reflected by the smaller range of costs.

5 DFARS Clause 242.203(a)(i)(B) -- Allowing the Retention of Contract Administration

The purpose of this research and analysis is to examine the "trade-offs" associated with the elimination of the following Defense Federal Acquisition Regulation Supplement (DFARS) provision:

> 242.203 Retention of Contract Administration
>
> (a)(i) DoD activities shall not retain any contract for administration that requires performance of any contract administration function at or near contractor facilities, except contracts for:
>
> (B) Research and development with universities

5.1 Background

The DoD IG report, of January 1998, recommended the elimination of DFARS 242.203(a)(i)(B). The Acting Deputy Secretary, as well as representatives of the Navy, Army and Air Force non-concurred with the recommendation. In their comments, they suggested that a more thorough review of the methods employed by the Components to conduct administration of their contracts for research and development (R&D) with universities was required prior to making a determination about the disposition of the DFARS clause.

If this DFARS clause was eliminated, DoD activities contracting with universities for research and development would have to delegate any contract administration functions that needed to be performed at or near the university. These functions would be delegated in accordance with the Federal Directory of Contract Administration Services Components.

5.1.1 Methodology

The methodology used in this study was designed to examine the possible ramifications of the elimination of DFARS 242.203 (a)(i)(B). To accomplish this goal, a three-track strategy was employed.

Track 1. Determine the origin of DFARS 242.203(a)(i)(B). The strategy used to determine the origin of DFARS 242.203 (a)(i)(B) entailed a thorough search and review of public information available on the origin and history of that provision. Research included the Internet, libraries, and the Defense Acquisition Regulations Directorate for a review of the DFARS case history.

Track 2: Determine the amount of funding impacted by DFARS 242.203 (a)(i)(B). Public information regarding the amount of funding impacted by this DFARS was identified and analyzed.

Track 3: Establish an overall understanding of the way R&D contracts with universities are administered by all DoD components. This approach involved conducting interviews with a variety of individuals from the university community, Federally Funded Research and Development Centers (FFRDCs) and University Affiliated Research Centers (UARCs), as well as representatives of DoD's Components and agencies. FFRDCs and UARCs are further defined in Appendix I.

5.1.2 Limitations and Assumptions

5.1.2.1 Limitations

By the language of the DFARS, this study limited its investigation and analysis to the administration of *contracts* for *research and development* with *universities* by the DoD or its components.

The number of individuals interviewed for this study was limited by the duration of the study and the subject's willingness to participate.

Additionally, the quality and amount of information available for review as well as a need to maintain efficiency limited this study. The availability of public information on the background and history of the DFARS clause was also limiting. Minimal information was available from the Defense Acquisition Regulations Directorate on the history of the regulation.

5.1.2.2 Assumptions

The primary assumption of this study was that the opinions and experiences of the universities, FFRDCs, UARCs and DoD personnel interviewed were representative of their respective organizations and the university research community at large.

5.2 Findings

5.2.1 The Origins of DFARS 242.203 (a)(i)(B)

No supporting or historical data on the origins or changes over time of this authority to retain CAS could be found. However, the authority to retain CAS responsibility for R&D contracts goes back a long way in the Defense procurement regulations. The Armed Services Procurement Regulations (ASPR), the predecessor of the DFARS, authorizes retention of CAS for all R&D contracts irrespective of the recipient (APR 20-703.2(iii)) and grants for basic research at educational institutions and other nonprofit organizations (ASPR 20.03.2(iv))[12]. Today, the DFARS allows retention of CAS for any R&D contract with universities. The DFARS does not apply to grants and other assistance instruments, which are the majority of DoD R&D awards to universities.

5.2.2 Magnitude of Funding Impacted by DFARS 242.203 (a)(i)(B)

Several categorizations of educational institutions, including non-profit education, non-profit organization and small business, are used when reporting data to the Federal Procurement Data Center. For the purposes of this study, all DoD R&D contract entries between Fiscal Year (FY) 1995 through the third quarter of 1998 were reviewed. From this list, a subset of contracts awarded to educational institutions was created. To ensure that all educational institutions were included in this subset, the list was sorted by reviewing the contractor name as well as contractor type.

[12] Armed Services Procurement Regulations, 1 January 1969.

As shown in Figure 5-1, the R&D contractual obligations to educational institutions between FY 1995 and FY 1998 (Q3) was relatively small when compared to the total DoD R&D expenditures for that period. Universities receive approximately $1 billion in R&D contracts annually. The majority of funds via contracts are awarded to other organizations such as large for profit businesses and other non-profit organizations. This data portrays contract obligations exclusively. It does not reflect funds obligated through assistance vehicles such as grants or cooperative agreements.

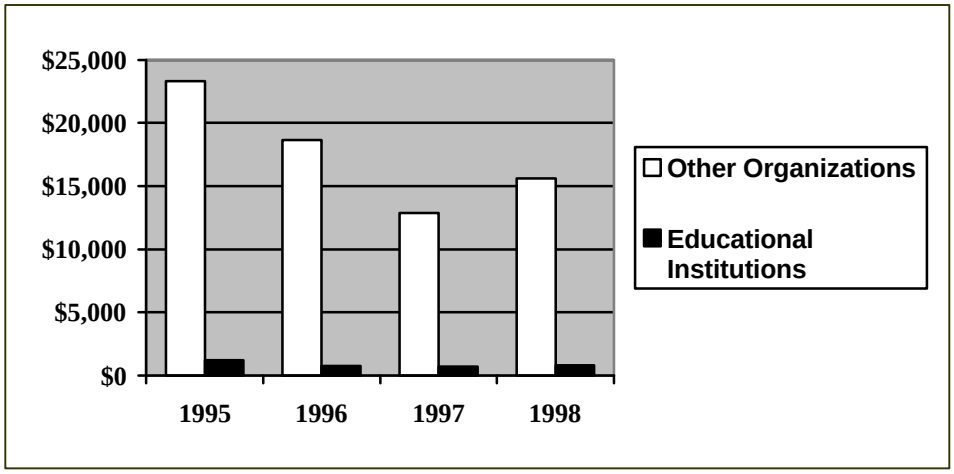


Figure 5-1 DoD R&D Contract Obligations FY 95 – FY 98 (Q3) (In Millions)

In FY 1997, the Air Force obligated the majority of the R&D dollars contractually awarded to universities, as shown in Figure 5-2. This is most likely attributable to the fact that the Air Force is the "parent" organization of two university sponsored FFRDCs that are recipients of large obligations, namely MIT's Lincoln Labs and Carnegie Mellon's Software Engineering Institute.

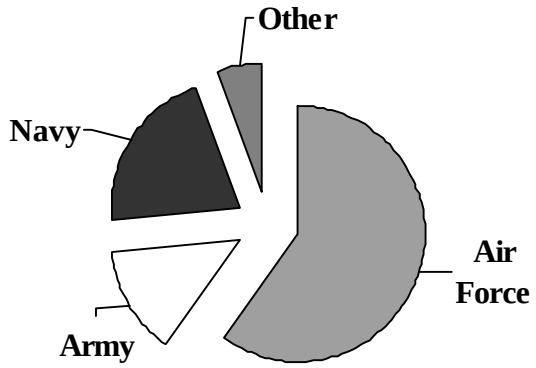


Figure 5-2 Distribution of FY 1997 DoD Component R&D Contract Obligations with Universities

In 1998, of the top 50 parent companies receiving the largest dollar volume of prime contract awards, there were only two educational institutions: Johns Hopkins University, ranked 38th, and MIT, ranked 29th. Ten universities were included in the top 100 DoD prime RDT&E contracts over $25,000 awarded in FY 1998 to United States educational and non-profit

institutions. These ten universities, shown in Figure 5-3, account for approximately $927 million in obligations, and include the two university sponsored FFRDCs and five of the six UARCs.

Rank	University Name	Total Contract Award Dollars
10	Massachusetts Institute of Technology	$369,499,000
14	Johns Hopkins University	$302,751,000
36	Pennsylvania State University	$54,862,000
39	University of Texas System	$49,771,000
40	Carnegie Mellon University	$49,703,000
75	University of California	$23,098,000
78	Georgia Tech Research Corporation	$20,690,000
81	University of Southern California	$19,292,000
82	Utah State University Inc.	$19,185,000
87	The University of Dayton Inc.	$17,713,000

Source: DIOR

Figure 5-3 U.S. Educational Institutions included in the Top 100 DoD Prime RDT&E Contracts Awarded to US Educational Institutions and Non-Profits in FY 1998

In summary, the DFARS provision today relates to and impacts primarily contracts awarded to the relatively large, university-affiliated laboratories, including the FFRDCs and UARCs.

5.2.3 How R&D Contracts with Universities are Administered

The following sections summarize the information collected from telephone interviews conducted with representatives of universities, including FFRDCs and UARCs, Army, Navy, Air Force, DoD, and ONR.

5.2.3.1 Award Vehicles

It was universally acknowledged by everyone interviewed that it has become increasingly more common for R&D funds to be awarded to universities through grants and cooperative agreements. Grants are viewed as the more appropriate vehicle in most cases.

The limited use of contracts for university R&D is exemplified in the breakdown of awards made by the Air Force Office of Scientific Research (AFOSR). Annually, the AFOSR awards approximately 1100 to 1200 grants and cooperative agreements and only two to three contracts. Review of the DoD R&D contracts held by Massachusetts Institute of Technology (MIT) suggest that the trend toward grants and cooperative agreements is Department-wide. MIT currently has 278 grants and cooperative agreements with a variety of DoD organizations and only 38 contracts. The migration towards the use of grants has also affected the business processes of the obligating organizations, such as Fort Hauchuca. They received authority to award grants in FY 98 and anticipate issuing more grants than contracts in the future.

Contracts are still in use for the two FFRDCs associated with universities (Lincoln Laboratories and Software Engineering Institute) and the UARCs. These research centers receive most of their R&D funding via large task order contracts.

5.2.3.2 Current Status of Administration of DoD R&D Contracts with Universities

Given the short duration of this study, it was not possible to get an accurate count of the number of DoD contracts being retained for administration and the number of contracts whose administrative function were fully or partially delegated. We also have no reliable data as to why the issuing organizations retain CAS functions. Currently, this information is not collected. There is an effort underway by DDR&E to try to capture such information for grants directly, and by way of comparison to the grants data, for contracts. Therefore, the information presented in this study, is preliminary and must be considered approximate.

Interviews conducted for this study indicated that ONR's penetration in the administration of DoD's R&D contracts with universities, other than FFRDCs and UARCs, is quite deep. Of course, ONR acts as the administrator of all Navy R&D contracts with universities. According to ONR representatives and confirmed by interviews with Air Force representatives, ONR administers most of the Air Force R&D contracts with universities. All AFOSR contracts are administered by ONR. Although ONR representatives indicated that they act as administrator for a large number of the Army's R&D contracts with universities, this information was not confirmed**.** The administration pattern of DoD R&D contracts awarded to MIT, shown in Figure 5-4, also illustrates ONR's dominance:

DoD Contracts	Number of Contracts
Total	38
Administered by ONR	32
Administered by Other	5

Figure 5-4 Administration of DoD Contracts with MIT

The contract administration functions for both university affiliated FFRDCs is retained by the Air Force's Electronics Systems Center (ESC). Contracts with three of the four Navy sponsored UARCs are administered by ONR. The fourth Navy sponsored UARC, the Johns Hopkins University Applied Physics Lab, is administered by DCMC. The distinction is that Johns Hopkins employs commercial cost principles and therefore delegated administration is assigned to DCMC. Fort McPherson retains the contract administration for Georgia Tech Research Institute.

5.2.3.3 Drivers in Determining the Disposition of Administrative Functions of R&D Contracts with Universities

Interviews conducted for this study suggested the following:

- The organizational affiliation of a contract administrator is of less importance than the individual's understanding of the university environment, cost and business practices,
- The physical location of the contract administrator is generally not a critical factor
- A contract administrator who acts as a single point of contact for all of a university’s contracts is preferable to multiple contract administrators

Contract Administrator Affiliation. Although differences were found in the way R&D contracts with FFRDCs, UARCs, and other universities are administrated, representatives of all three of these groups indicated that the most important factor determining the success of a contract administrator is his or her knowledge. Specifically, the administrator must understand the unique university culture, the needs of university R&D, and university cost principles and other regulations governing university research with the Federal Government. Specific organizational affiliation of the contract administrator is of little importance.

Anecdotal accounts of university personnel indicated a great level of frustration when working with administrators whose experience is exclusively with commercial contracts. In one instance, an Army installation chose to retain administration of its own R&D contract with one of the larger universities. Representatives of that university reported investing considerable effort educating that administrator who was unfamiliar with the treatment of indirect costs, property issues and standard cost accounting practices of an educational institution.

In the case of FFRDCs and UARCs, there was some support for the notion that when the administration function is retained by the contracting agency, communications are streamlined and response times improved. This was particularly true for the larger more complex contracts where many actions are required on a daily basis. However, even representatives from the FFRDCs agreed that this issue was not as critical as the knowledge and experience of the individual administrator.

Physical location of the contract administrator. Each university representative agreed that it was beneficial to have a contract administrator physically located close to the university or facility where the work is being conducted. However, the same group of individuals, with the exception of those from Lincoln Labs and University of Washington Applied Physics Laboratory, believed that the duties of the administrator could easily and efficiently be conducted from another site. Generally, the benefits noted for having a contract administrator in close physical proximity related to the ability to build a working, professional and team-spirited relationship between university personnel and their DoD counterparts. Representatives from Lincoln Laboratories felt that having a contract administrator at their site was a necessity rather than a luxury. This was due to the amount of daily interaction between the contract administrator and laboratory affiliated personnel, and the need for efficient resolution of all actions.

A single point of contact contract administrator. Regardless of the size of the university or laboratory, all individuals interviewed noted that the ability to have a single point of contact for all of their contracts was preferable. This was of particular interest to UARCs that operate under task order contracts, and may be trying to manage over one hundred tasks simultaneously.

5.3 Conclusions and Recommendations

It is recommended that DFARS 242.203 (a)(i)(B) be eliminated. Overall, the amount of university R&D performed via contracts is declining. Delegation of CAS should be aimed at ensuring that university R&D contracts are administered by individuals who have the appropriate experience and knowledge to effectively and efficiently perform the required duties. This knowledge and experience is not necessarily resident in one organization, and is not typically resident in the organizations awarding the contracts. ONR has established a reputation for administration of grants and contracts with universities, which employ the university cost principles of OMB Circular A-21. DCMC likewise has the knowledge and experience to

administer contracts and other agreements with universities that employ for-profit cost principles. These distinctions in organizational excellence should be reflected in the Federal Directory of Contract Administration Services Components, maintained by DCMC, which should be the guide for delegation of CAS for university R&D contracts.

Preliminary indications are that CAS for university R&D contracts can be satisfactorily performed if delegated to the appropriately experienced administrators. A further more detailed examination of the CAS requirements and operations of university-affiliated laboratories, including the UARCS and FFRDCs, is recommended to determine whether those contractual relationships warrant retention of CAS by the sponsoring organizations, or require on-site performance of CAS. Again the appropriate performer of CAS for each university should be identified in the Federal Directory of CAS Components, eliminating the need for the DFARS CAS retention provision.

It is further suggested that no action be taken on the final recommendation until the DDR&E has completed its collection of data on the current assignments of CAS for university R&D contracts. The potential volume of work which may be redirected to any CAS provider; whether it be ONR, DCMC, or other component; should be known as closely as possible to ensure that the recipient organization of the CAS delegation is prepared for the volume of work. Additionally, any unique circumstances at each of the universities needs to be considered prior to requiring the contract placement office to delegate post-award administration. If the final product of the DDR&E effort supports the findings of this study, then DoD should proceed with elimination of this DFARS provision.

Appendix A
FAR 42.302 Contract Administration Functions
DFARS 242.302 Contract Administration Functions

Appendix A
FAR 42.302 Contract Administration Functions

(a) The following contract administration functions are normally delegated to a CAO. The contracting officer may retain any of these functions, except those in paragraphs (a)(5), (a)(9), and

(a)(11) of this section, unless the contracting officer has been designated to perform these functions by the cognizant Federal agency (see 42.001).

(1) Review the contractor's compensation structure.

(2) Review the contractor's insurance plans.

(3) Conduct post-award orientation conferences.

(4) Review and evaluate contractors' proposals under Subpart 15.4 and, when negotiation will be accomplished by the contracting officer, furnish comments and recommendations to that officer.

(5) Negotiate forward pricing rate agreements (see 15.407-3).

(6) Negotiate advance agreements applicable to treatment of costs under contracts currently assigned for administration (see 31.109).

(7) Determine the allowability of costs suspended or disapproved as required (see Subpart 42.8), direct the suspension or disapproval of costs when there is reason to believe they should be suspended or disapproved, and approve final vouchers.

(8) Issue Notices of Intent to Disallow or not Recognize Costs (see Subpart 42.8).

(9) Establish final indirect cost rates and billing rates for those contractors meeting the criteria for contracting officer determination in Subpart 42.7.

(10) Attempt to resolve issues in controversy, using ADR procedures when appropriate (see subpart 33.2); prepare findings of fact and issue decisions under the Disputes clause on matters in which the administrative contracting officer (ACO) has the authority to take definitive action.

(11) In connection with Cost Accounting Standards (see 48 CFR 30.601 and 48 CFR Chapter 99 (FAR Appendix)).

(i) Determine the adequacy of the contractor's disclosure statements;

(ii) Determine whether disclosure statements are in compliance with Cost Accounting Standards and Part 31;

(iii) Determine the contractor's compliance with Cost Accounting Standards and disclosure statements, if applicable; and

(iv) Negotiate price adjustments and execute supplemental agreements under the Cost Accounting Standards clauses at 48 CFR 52.230-2, 52.230-3, 52.230-4, 52.230-5, and 52.230-6.

(12) Review and approve or disapprove the contractor's requests for payments under the progress payments or performance-based payments clauses.

(13) Make payments on assigned contracts when prescribed in agency acquisition regulations.

(14) Manage special bank accounts.

(15) Ensure timely notification by the contractor of any anticipated overrun or underrun of the estimated cost under cost-reimbursement contracts.

(16) Monitor the contractor's financial condition and advise the contracting officer when it jeopardizes contract performance.

(17) Analyze quarterly limitation on payments statements and recover overpayments from the contractor.

(18) Issue tax exemption forms.

(19) Ensure processing and execution of duty-free entry certificates.

(20) For classified contracts, administer those portions of the applicable industrial security program delegated to the CAO (see Subpart 4.4).

(21) Issue work requests under maintenance, overhaul, and modification contracts.

(22) Negotiate prices and execute supplemental agreements for spare parts and other items selected through provisioning procedures when prescribed by agency acquisition regulations.

(23) Negotiate and execute contractual documents for settlement of partial and complete contract terminations for convenience, except as otherwise prescribed by Part 49.

(24) Negotiate and execute contractual documents settling cancellation charges under multi-year contracts.

(25) Process and execute novation and change of name agreements under Subpart 42.12.

(26) Perform property administration (see Part 45).

(27) Approve contractor acquisition or fabrication of special test equipment under the clause at

52.245-18, Special Test Equipment.

(28) Perform necessary screening, redistribution, and disposal of contractor inventory.

(29) Issue contract modifications requiring the contractor to provide packing, crating, and handling services on excess Government property. When the ACO determines it to be in the Government's interests, the services may be secured from a contractor other than the contractor in possession of the property.

(30) In facilities contracts.

(i) Evaluate the contractor's requests for facilities and for changes to existing facilities and provide appropriate recommendations to the contracting officer;

(ii) Ensure required screening of facility items before acquisition by the contractor;

(iii) Approve use of facilities on a noninterference basis in accordance with the clause at 52.245-9, Use and Charges;

(iv) Ensure payment by the contractor of any rental due; and

(v) Ensure reporting of items no longer needed for Government production.

(31) Perform production support, surveillance, and status reporting, including timely reporting of potential and actual slippages in contract delivery schedules.

(32) Perform preaward surveys (see Subpart 9.1).

(33) Advise and assist contractors regarding their priorities and allocations responsibilities and assist contracting offices in processing requests for special assistance and for priority ratings for privately owned capital equipment.

(34) Monitor contractor industrial labor relations matters under the contract; apprise the contracting officer and, if designated by the agency, the cognizant labor relations advisor, of actual or potential labor disputes; and coordinate the removal of urgently required material from the strike-bound contractor's plant upon instruction from, and authorization of, the contracting officer.

(35) Perform traffic management services, including issuance and control of Government bills of lading and other transportation documents.

(36) Review the adequacy of the contractor's traffic operations.

(37) Review and evaluate preservation, packaging, and packing.

(38) Ensure contractor compliance with contractual quality assurance requirements (see Part 46).

(39) Ensure contractor compliance with contractual safety requirements.

(40) Perform engineering surveillance to assess compliance with contractual terms for schedule, cost, and technical performance in the areas of design, development, and production.

(41) Evaluate for adequacy and perform surveillance of contractor engineering efforts and management systems that relate to design, development, production, engineering changes, subcontractors, tests, management of engineering resources, reliability
and maintainability, data control systems, configuration management, and independent research and development.

(42) Review and evaluate for technical adequacy the contractor's logistics support, maintenance, and modification programs.

(43) Report to the contracting office any inadequacies noted in specifications.

(44) Perform engineering analyses of contractor cost proposals.

(45) Review and analyze contractor-proposed engineering and design studies and submit comments and recommendations to the contracting office, as required.

(46) Review engineering change proposals for proper classification, and when required, for need, technical adequacy of design, producibility, and impact on quality, reliability, schedule, and cost; submit comments to the contracting office.

(47) Assist in evaluating and make recommendations for acceptance or rejection of waivers and deviations.

(48) Evaluate and monitor the contractor's procedures for complying with procedures regarding restrictive markings on data.

(49) Monitor the contractor's value engineering program.

(50) Review, approve or disapprove, and maintain surveillance of the contractor's purchasing system (see Part 44).

(51) Consent to the placement of subcontracts.

(52) Review, evaluate, and approve plant or division-wide small, small disadvantaged and women-owned small business master subcontracting plans.

(53) Obtain the contractor's currently approved company- or division-wide plans for small, small disadvantaged and women-owned small business subcontracting for its commercial products, or,

if there is no currently approved plan, assist the contracting officer in evaluating the plans for those products.

(54) Assist the contracting officer, upon request, in evaluating an offeror's proposed small, small disadvantaged and women-owned small business subcontracting plans, including documentation of compliance with similar plans under prior contracts.

(55) By periodic surveillance, ensure the contractor's compliance with small, small disadvantaged and women-owned small business subcontracting plans and any labor surplus area contractual requirements; maintain documentation of the contractor's
performance under and compliance with these plans and requirements; and provide advice and assistance to the firms involved, as appropriate.

(56) Maintain surveillance of flight operations.

(57) Assign and perform supporting contract administration.

(58) Ensure timely submission of required reports.

(59) Issue administrative changes, correcting errors or omissions in typing, contractor address, facility or activity code, remittance address, computations, which do not require additional contract funds, and other such changes (see 43.101).

(60) Cause release of shipments from contractor's plants according to the shipping instructions. When applicable, the order of assigned priority shall be followed; shipments within the same priority shall be determined by date of the instruction.

(61) Obtain contractor proposals for any contract price adjustments resulting from amended shipping instructions. Review all amended shipping instructions on a periodic, consolidated basis to ensure that adjustments are timely made. Except when the ACO has settlement authority, the ACO shall forward the proposal to the contracting officer for contract modification. The ACO shall not delay shipments pending completion and formalization of negotiations of revised shipping instructions.

(62) Negotiate and/or execute supplemental agreements, as required, making changes in packaging subcontractors or contract shipping points.

(63) Cancel unilateral purchase orders when notified of nonacceptance by the contractor. The CAO shall notify the contracting officer when the purchase order is canceled.

(64) Negotiated and execute one-time supplemental agreements providing for the extension of contract delivery schedules up to 90 days on contracts with an assigned Critically Designator of C (see 42.1105). Notification that the contract delivery schedule is being extended shall be

provided to the contracting office. Subsequent extensions on any individual contract shall be authorized only upon concurrence of the contracting office.

(65) Accomplish administrative closeout procedures (see 4.804-5).

(66) Determine that the contractor has a drug-free workplace program and drug free awareness program (see subpart 23.5).

(67) Support the program, product, and project offices regarding program reviews, program status, program performance and actual or anticipated program problems.

(68) Evaluate the contractor's environmental practices to determine whether they adversely impact contract performance or contract cost, and ensure contractor compliance with environmental requirements specified in the contract. Contracting officer responsibilities include, but are not limited to.

(i) Ensuring compliance with specifications requiring the use of environmentally preferable and energy-efficient materials and the use of materials or delivery of end items with the specified recovered material content. This shall occur as part of the quality
assurance procedures set forth in part 46.

(ii) As required in the contract, ensuring that the contractor complies with the reporting requirements relating to recovered material content utilized in contract performance.

(69) Administer commercial financing provisions and monitor contractor security to ensure its continued adequacy to cover outstanding payments, when on-site review is required.

(b) The CAO shall perform the following functions only when and to the extent specifically authorized by the contracting office:

(1) Negotiate or negotiate and execute supplemental agreements incorporating contractor proposals resulting from change orders issued under the Changes clause. Before completing negotiations, coordinate any delivery schedule change with the
contracting office.

(2) Negotiate prices and execute priced exhibits for unpriced orders issued by the contracting officer under basic ordering agreements.

(3) Negotiate or negotiate and execute supplemental agreements changing contract delivery schedules.

(4) Negotiate or negotiate and execute supplemental agreements providing for the deobligation of unexpended dollar balances considered excess to known contract requirements.

(5) Issue amended shipping instructions and, when necessary, negotiate and execute supplemental agreements incorporating contractor proposals resulting from these instructions.

(6) Negotiate changes to interim billing prices.

(7) Negotiate and definitize adjustments to contract prices resulting from exercise of an economic price adjustment clause (see subpart 16.2).

(8) Issue change orders and negotiate and execute resulting supplemental agreements under contracts for ship construction, conversion, and repair.

(9) Execute supplemental agreements on firm-fixed price supply contracts to reduce required contract line item quantities and deobligate excess funds when notified by the contractor of an inconsequential delivery shortage, and it is determined that such
action is in the best interests of the Government, notwithstanding the default provisions of the contract. Such action will be taken only upon the written request of the contractor and, in no event shall the total downward contract price adjustment resulting from an inconsequential delivery shortage exceed $250.00 or 5 percent of the contract price, whichever is less.

(10) Execute supplemental agreements to permit a chance in place of inspection at origin specified in firm fixed-price supply contracts awarded to nonmanufacturers, as deemed necessary to protect the Government's interests.

(11) Prepare evaluations of contractor performance in accordance with subpart 42.15.

(c) Any additional contract administration functions not listed in 42.302(a) and (b), or not otherwise delegated, remain the responsibility of the contracting office.

DFARS 242.302 Contract Administration Functions

(a)(4) Also, review and evaluate-
(A) Contractor estimating systems (see FAR 15.407-5); and
(B) Contractor material management and accounting systems under Subpart 242.72.

(7) See 242.7503 for ACO responsibilities with regard to receipt of an audit report identifying significant accounting system or related internal control deficiencies.

(8) Monitor contractor costs under Subpart 242.70.

(9) For additional contract administration functions related to IR&D/B&P projects performed by major contractors, see 242.771-3(a).

(19) Also negotiate and issue contract modifications reducing contract prices in connection with the provisions of paragraph (b) of the clause at FAR 52.225-10, Duty-Free Entry.

(33) Also perform industrial readiness and mobilization production planning field surveys and negotiate schedules.

(39) See 223.370 for safety requirements on contracts for ammunition and explosives.

(41) The Defense Contract Management Command (DCMC) has responsibility for reviewing earned value management system (EVMS) plans and verifying initial and continuing contractor compliance with DoD EVMS criteria.

(67) Also support program offices and buying activities in precontractual efforts leading to a solicitation or award.

(S-70) Serve as the single point of contact for all Single Process Initiative (SPI) Management Council activities. The ACO shall negotiate and execute facilitywide class modifications and agreements for SPI processes, when authorized by the affected components.

(b)(S-70) Issue, negotiate and execute orders under basic ordering agreements for overhaul, maintenance and repair.

APPENDIX B
Sources of Information

The following sources were contacted and interviewed for data pursuant to the subject matter and organizations within the scope of this study. Interviews were conducted either telephonically or in person. Those sites visited for tours and in-depth discussion are annotated with an asterisk (*)

I Interview Sources

Carnegie Mellon Software Engineering Institute

Office of Contracts Administration

Council on Government Relations

Office of the President

Defense Advanced Research Programs Administration

Director of Policy

Defense Contract Audit Agency

Director of the Office of Policy and Plans

Defense Contract Management Command

Contract Business Operations Team
Business Office Team
Customer Support Team
Paperless Contracting Office

Department of the Air Force

Air Force Office of Scientific Research, Office of Contract Administration
Wright Patterson Air Force Base, Office of Contracts Administration
Hanscomb Air Force Base, Office of Contracts Administration

Department of the Army

Industrial Operations Command

- Office of Operations and Management Team
- GOCO Contracting Team

*Lake City Army Ammunitions Plant, Plant Commander and Staff
*Sunflower Army Ammunitions Plant, Commander's Representative
Kansas City Army Ammunitions Plant, Commander's Representative
Fort Hauchuca, Office of Contracts Administration

Department of the Navy

Naval Sea Systems Command, Supervisor of Shipbuilding, Conversion and Repair Management Office
*Supervisor of Shipbuilding, Conversion and Repair, Newport News, Supervisor and Operations and Management Staff
*Supervisor of Shipbuilding, Conversion and Repair, Portsmouth, Deputy Supervisor and Contracts Manager
*Supervisor of Shipbuilding, Conversion and Repair, San Diego Deputy Supervisor and Operations and Maintenance Staff

Office of Naval Research

- Director of Acquisition
  - Executive Director for Acquisition Management
  - Office of Acquisition Computing Environment
  - Office of Contracting Activity and Policy
  - Office of University Business Affairs
    - Operations Branch, Engineering Services
      - Director for the Boston Regional Office
      - Director for the Seattle Regional Office
      - Director for the Chicago, IL Regional Office
      - Property Specialist for the Seattle Regional Office
- Program Manager for Information Electronics and Surveillance
- Program Manager for Ocean, Atmosphere and Space
- Program Manager for Engineering, Materials, and Physical Science

Office of the Director of Defense Research and Engineering

Office of the Director of Research, Director and Staff

Office of Management and Budget

OMB Policy Analyst

Universities

Massachusetts Institute of Technology, Grants Administration Office
Stanford University, Contract and Grants Administration Office
University of Alabama, Office of Sponsored Projects
Johns Hopkins University, Office of Business Operations
University of Texas, Applied Research Lab, Office of Contracts and Purchasing
Lincoln Laboratories, MIT, Office of Contracts Administration
Georgia Tech University, Office of Contracts and Grants Administration
University of Southern California Office of Contracts

Georgia Tech Research Institute, Fort McPherson, Office of the Chief for Information Technology
University of California, Berkley, Director for the Office of Research
University of Washington, Applied Physics Laboratory, Office of the Assistant Director

II References

Procurement Regulations

- Federal Acquisition Regulation
- Defense Federal Acquisition Regulation Supplement
- Armed Services Procurement Regulation

Cost Principles

- Cost Principles for Universities, Office of Management and Budget Circular A-21
- Cost Principles for Non-Profit Organizations, Office of Management and Budget Circular A-122
- Inflation Factors, Office of Management and Budget Circular A-94

Previous Studies

- Consolidation of DoD Contract Administration Services, Report No. 98-604, January 15, 1998
- 1990 AAP Study to Determine Exclusion of Army Ammunition Plants (AAPs from Consolidation with DCMC
- 1990 SUPSHIP Study to Determine Exclusion of SUPSHIP from Consolidation with DCMC
- 1993 SUPSHIP Study to Streamline Contract Administration to One Organization

DCMC

- Defense Management Review Decision 916 of 1989 (established DCMC)
- DCMC Metrics Guidebook, Fifth Edition, 1999
- DCMC brief – "DCMC Paperless Contracting Center Overview"

SUPSHIP

- SUPSHIP Operations Manual (SOM), June 1994
- Navy Acquisition Procedures Supplement NAPS 52.42
- Naval Sea Systems Command Contracting Handbook NCH 42.2
- Ship Acquisition Contract Administration Manual (SACAM)
- Ship Repair Contracting Manual (SRCM)
- SUPSHIP San Diego New Construction and Repair Project Team CAS/Non-CAS Time Allocation FY 1998
- SUPSHIP San Diego Functions for New Construction and Repair (Civilian and Military)
- SUPSHIP San Diego New Construction Definition of Cross Team Functional Skills
- SUPSHIP Newport News CAS/Non-CAS Project Team Time Allocations
- SUPSHIP Summary Workyears and Time Percentages for New Construction and Repair (FY 1997) (For all SUPSHIPs)

- Historical Database – Private Sector CNO Schedule Availability Completions
- FY 1998 SUPSHIP Progress Payments

ONR

- Department of Defense Grant and Agreement Regulations DOD 3210.6R
- Using Procurement Contracts and Grants and Cooperative Agreements, 31 USC Chapter 63
- Memo to the Assistant Secretary of Defense for Installation and Logistics, 31 July 1966
- SECNAV Notice subject: Office of Naval Research dated 4 December 1992
- ONR Briefing – "ONR Migration to a Paperless Office by Year 2000"
- Midterm Report of Results of the "Expanded Authorities Portion of the Federal Demonstration Project: Cutting the Red Tape on Research and Increasing Scientific Productivity"
- ONR Reorganization Budget Summary dated 21 October 1992
- ONR FY 1999 Salary and Benefit Data
- ONR Metrics of Contract Administration Activity Workload
- ONR University Business Affairs Key Workload Measures dated 24 December 1998
- ONR Contract Administration Overhead Data FY 1999
- ONR FY 99Apportioned Budget
- ONR Instruction 5430.16, Office of Naval Research Mission Statement dated 23 September 1998
- Final Department of Defense 6.1 Electronic Data Interchange/Electronic Funds Transfer (EDI/EFT) Engineering Study, dated 14 February 1998
- Memorandum from the Undersecretary of Defense (Acquisition and Technology), Electronic Data Interchange/Electronic Funds Transfer
- Report of the 1991 Code 14 Business Management Review dated 19 December 1991 (Details of the ONR Regionalization)
- National Science Foundation data regarding dollar value of grants administered by DOD

Army Ammunition Plant

- IOC Regulation 10-8, Organization and Functions, Active Army Ammunition Plants, 20 June 1997
- IOC Regulation 10-9, Organization and Functions, Inactive and Excess Army Ammunition Plants, 3 July 1997
- Memorandum for Under Secretary of Defense (Acquisition and Technology), subject Reform of Ammunition Procurement dated 30 June 1998
- Memorandum for Commander, Headquarters, Industrial Operations Command, subject, Workload Based Manpower Requirements Program (WBMRP) Study Final Report – Active and Inactive Ammunitions Plants dated 14 January 1997

APPENDIX C
Overhead Rate Calculations

D-1 Overhead/Burden Rates

Labor rates were calculated using an average salary for CAS staff within each organization, combined with a burden factor. To account for the total cost of personnel to an organization, i.e. costs in addition to salary, a burden factor was calculated for each organization, which was then applied to the average salary. The burden factor reflects costs associated with information technology, facilities rent and maintenance, utilities, training, printing/reproduction, travel, supplies, and administrative support. Non-wage personnel costs such as vacation, sick leave, health insurance, and thrift saving are also included, consistently across all the organizations studied.

1.1 ONR

The following approach was used to calculate an overhead rate for ONR.

1. Calculate the average unburdened salary. The unburdened salary was calculated by dividing the number of CAS personnel (81) into the total for the unburdened CAS salaries ($4,108K). This is equal to $51K.
2. Calculate the average burdened CAS salary. The fully loaded CAS ONR salary was calculated by adding the total unburdened CAS salaries ($4,108K), with the total salary fringe (vacation, sick leave, thrift savings etc) ($998K), and the total overhead costs provided by ONR, allocated to CAS which include travel, facilities rent and maintenance, communications, utilities, information systems operation and maintenance ($1,781K). The total burdened salary for ONR is $6,887K. This figure was divided by the number of CAS employees (81) to calculate their fully burdened salary ($85K).
3. Calculate ONR's overhead or burden rate. To calculate ONR's overhead rate, the burdened CAS salary of $85K was divided by the unburdened salary of $51K. The burden rate for ONR is 1.67.

1.2 SUPSHIP

The following approach was used to calculate an overhead rate for SUPSHIP.

1. Calculate the average unburdened salary. We calculated an average unburdened CAS salary based on a GS 9 salary ($31K) and the GS 12 salary ($50K) which equaled $41K.
2. Calculate the burdened salary. The burdened salary was calculated using FY 1998 historical information regarding total CAS personnel budget and number of FTEs performing the CAS function. The budget ($150M) was divided by the 2251 FTEs to equal the burdened salary of $66K.
3. Calculate SUPSHIP's burden rate. The burden rate was calculated by dividing the burdened salary of $66K by the average unburdened salary of $41K. The burden rate for SUPSHIP is 1.65.

1.3 AAP

The following approach was used to calculate an overhead rate for AAP

1. Calculate the average unburdened salary. The unburdened salary was calculated using the average active/inactive plant salaries, which were between $40K and $52K. The average salary for AAP is $46K.
2. Calculate the average burdened salary. The fully loaded AAP salary was calculated by adding the total unburdened salaries ($12,461K), with the total salary fringe (vacation, sick leave, thrift savings etc) of $3,426K, and the total AAP overhead costs (travel, facilities rent and maintenance, communications, utilities, information systems operation and maintenance) of $4,925K. The total burdened salary for AAP is $20,813K. This figure was divided by the number of employees (272) to calculate the average AAP burdened salary of $76.52K.
3. Calculate AAP's burden rate. To calculate AAP's overhead rate, the burdened salary of $76K was divided by the unburdened salary of $46K. The burden rate for AAP is 1.67.

1.4 DCMC

The following approach was used to calculate an overhead rate for DCMC.

1. Calculate the average unburdened salary. To calculate DCMC's unburdened rate we used the average annual salary of $64,644, and divided it by 2080, the number of hours in a work year. The unburdened hourly rate is equal to $31.08.
2. Calculate the average burdened salary. DCMC provided us with the established hourly rate they charge Government agencies for their services, $56.07. Government agencies for their services. It was concurred through discussions that this reflected DCMC's fully burdened rate.
3. Calculate DCMC's burden rate. The burden rate was calculated by dividing the burdened hourly rate of $56.07 by the unburdened hourly rate of $31.08. The burden rate for DCMC is ~ 1.8.

APPENDIX D
SUPSHIP WORKLOAD ANALYSIS

D SUPSHIP WORKLOAD ANALYSIS FOR THE DELEGATED CAS – QUALITATIVELY EQUIVALENT SERVICE

This analysis is the Navy's assessment of the staffing changes that would be required to transfer to DCMC the CAS functions now performed by SUPSHIP and **still provide a level of service and responsiveness that comes close to that which is provided in today's integrated SUPSHIP organization.** The SUPSHIP repair operations are analyzed separately from the new construction operations, as described below.

1.1 Ship Repair

For this analysis, SUPSHIP San Diego was used as a representative organization. Figure D-1 shows a representative SUPSHIP San Diego Project Team that would execute a nine-week ship repair availability. It shows the division of time spent on CAS and non-CAS functions for each individual assigned to the team.

# of Personnel	Position	CAS %	Non-CAS %
1	Ship Superintendent	0	100
1	Admin. Contract Officer	30	70
1	Program Manager	10	90
4	SBS Trade Specific	30 (120 total)	70
1	Quality Assurance	80	20
1	Material	5	95
1	Finance	10	90
1	Safety/Environment	60	40
1	Barge Representative	10	90
1	Design	10	90
13 TOTAL			

Figure D-1 SUPSHIP San Diego Ship Repair Project Team Annual Workload Division Model

Using the division of work for each Ship Repair Project Team member shown above, the annual CAS workload associated with the Project Team billets is 3.35 work years. A total of four billets would be transferred to DCMC to perform the CAS workload of 3.35 work years. Given the error range in estimating the volume of CAS, the need to transfer whole billets and the predicted loss of organizational integration and synergy from separating the CAS and non-CAS functions, it can be expected that this 3.35 work year workload will require four DCMC billets to accomplish. The ratio of billets to workload is 4/3.35, or 1.194.

Figure D-2 shows the application of this rationale across the repair workload at all SUPSHIP offices. The data in the "Repair CAS Work Years" column represents summary FY 1997 SUPSHIP workload data provided by the NAVSEA SUPSHIP Management Office. The result shows a requirement for 484 DCMC billets to accomplish the entire SUPSHIP repair CAS workload.

	Repair CAS Work Years	Repair CAS DCMC Billets
Bath	0.6	1
Groton	0.9	1
Jacksonville	56.8	68
New Orleans	20.7	25
Newport News	31.6	38
Pascagoula	15.9	19
Portsmouth	120.5	144
Puget Sound	25.9	31
San Diego	130	156
Total	**402.9***	**484***

Figure D-2 Repair CAS Billets

Following the above discussion, if the typical Repair Project Team performs 3.35 work years of CAS, then the remaining 9.65 work years are non-CAS workload. According to SUPSHIP analysis, this workload would require 11 billets, again due to the loss of flexibility, unique trade and skill requirements, and loss of inherent synergy in the original integrated organization.

Another way to demonstrate this is that the non-CAS workload of two of the four billets transferred could be absorbed within the remaining Project Team members, while the other two billets could not. The result, within SUPSHIP, is an increase of two billets for non-CAS to accommodate the transfer of four billets to DCMC. The ratio of billets to workload is 11/9.65, or 1.14.

The Figure D-3 shows the application of this rationale across the repair non-CAS workload at all SUPSHIP offices. The data in the "Repair Non-CAS Work Years" column comes from summary 1997 SUPSHIP workload data provided by the NAVSEA SUPSHIP Management Office. The results show a requirement for 1260 SUPSHIP billets to accomplish the repair non-CAS workload.

	Repair Non-CAS Work Years	Repair Non-CAS SUPSHIP Billets
Bath	44.8	51
Groton	14.37	17
Jacksonville	120.54	138
New Orleans	34.18	39

* Indicates number has been rounded

	Repair Non-CAS Work Years	**Repair Non-CAS SUPSHIP Billets**
Newport News	113.69	130
Pascagoula	75.3	86
Portsmouth	296.5	338
Puget Sound	75.7	87
San Diego	327.55	374
Total	1,102.6*	**1,260***

Figure D-3 Repair Non-CAS Billets

1.2 New Construction

A similar analysis was conducted to quantify the staffing changes for the new construction workload. This analysis used the SUPSHIP San Diego New Construction Project Team organization, comprised of 44 personnel, and the associated workload split estimate. Due to the larger size of the new construction team and the fact that the CAS/non-CAS split between members of the team is more distinct, the number of additional billets required to accomplish the workload in the alternative scenario is not as large as the repair case. The ratio of billets to workload for CAS is 1.037, and the ratio for non-CAS is 1.01. This results in 426 billets required to accomplish the CAS workload at DCMC, and 764 billets required at SUPSHIP to accomplish the non-CAS workload. The overall effect on the number of billets when SUPSHIP CAS is delegated to DCMC is shown in Figure D-4.

	New Construction			**Repair**			
	SUPSHIP	DCMC	TOTAL	SUPSHIP	DCMC	TOTAL	Grand Total
Status Quo	1,159	0	1,159	1,505	0	1,505	2,664
Alternative	764	426	1,190	1,260	484	1,744	2,934

Figure D-4 Number of Required Billets Overall

* indicates number has been rounded

Appendix E: SUPSHIP Detailed Cost Estimate and Basis of Cost Estimate

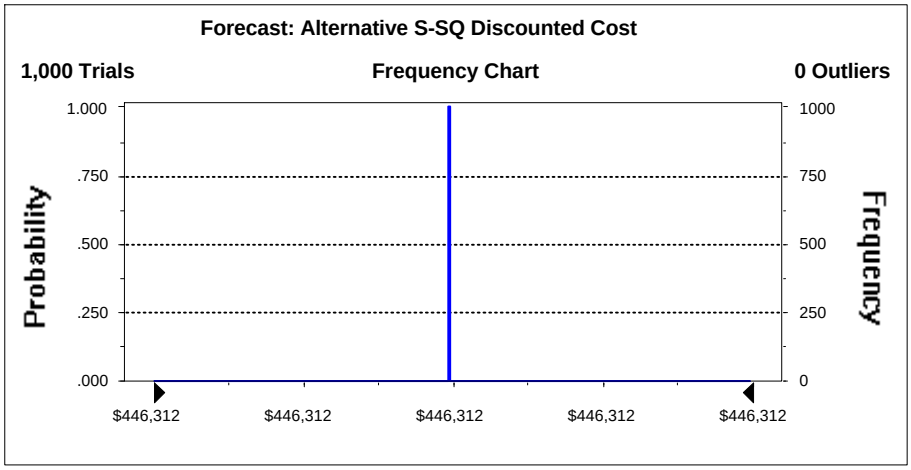
SUPSHIP Status Quo Cost Summary (K$)

(SUPSHIP retains CAS functions)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	Included in Labor Rates in Elements 2.2e & 2.2f									
2.2 Personnel											
2.2a DCMC Personnel (Addt'l for New Const.)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2b DCMC Personnel (Addt'l for Repair)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2c SUPSHIP Non-CAS Personnel (Addt'l for New Const.)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2d SUPSHIP Non-CAS Personnel (Addt'l for Repair)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2e SUPSHIP CAS Personnel (New Const.)	**$270,879**	$27,088	$27,088	$27,088	$27,088	$27,088	$27,088	$27,088	$27,088	$27,088	$27,088
2.2f SUPSHIP CAS Personnel (Repair)	**$268,480**	$26,848	$26,848	$26,848	$26,848	$26,848	$26,848	$26,848	$26,848	$26,848	$26,848
Total O&S Costs (Constant)	**$539,360**	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936
Total O&S Costs (Inflated)	**$612,520**	$55,177	$56,446	$57,744	$59,072	$60,431	$61,820	$63,242	$64,697	$66,185	$67,707
Total O&S Costs (Discounted)	**$446,312**	$52,062	$50,253	$48,506	$46,821	$45,194	$43,623	$42,108	$40,644	$39,232	$37,869
Total Investment and O&S Costs (Constant)	**$539,360**	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936	$53,936
Total Investment and O&S Costs (Inflated)	**$612,520**	$55,177	$56,446	$57,744	$59,072	$60,431	$61,820	$63,242	$64,697	$66,185	$67,707
Total Investment and O&S Costs (Discounted)	**$446,312**	$52,062	$50,253	$48,506	$46,821	$45,194	$43,623	$42,108	$40,644	$39,232	$37,869

SUPSHIP Status Quo Risk Summary

Statistics:	Value
Trials	1,000
Mean	$446,312
Median	$446,312
Mode	$446,312
Standard Deviation	$0
Variance	$0
Skewness	0.00
Kurtosis	+Infinity
Coefficient of Variability	0.00
Range Minimum	$446,312
Range Maximum	$446,312
Range Width	$0
Mean Standard Error	$0.00



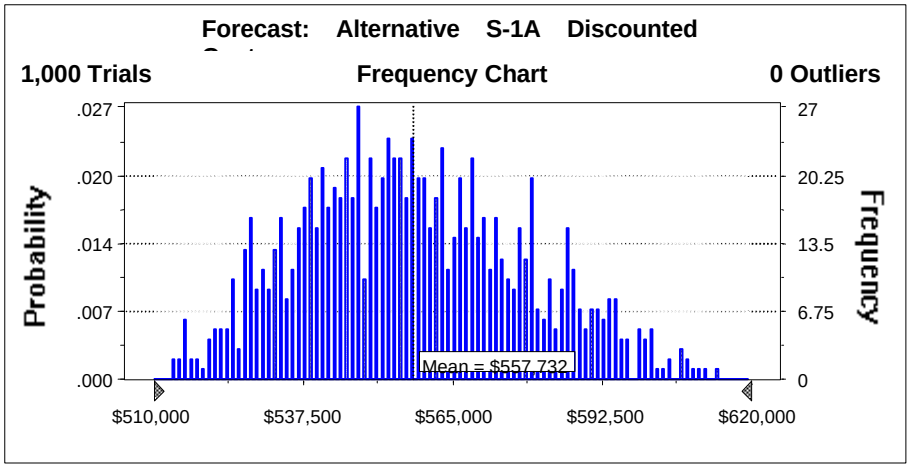
SUPSHIP Alternative S-1A Cost Summary (K$)

(SUPSHIP CAS functions transfer to DCMC, but personnel physically located at SUPSHIP)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$2,730**	$1,365	$1,365	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$3,730**	$1,865	$1,865	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$3,860**	$1,908	$1,952	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$5,338**	$1,800	$3,538	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	Included in Labor Rates in Elements 2.2a & 2.2b									
2.2 Personnel											
2.2a DCMC Personnel (Addt'l for New Const.)	**$301,806**	$30,181	$30,181	$30,181	$30,181	$30,181	$30,181	$30,181	$30,181	$30,181	$30,181
2.2b DCMC Personnel (Addt'l for Repair)	**$303,993**	$30,399	$30,399	$30,399	$30,399	$30,399	$30,399	$30,399	$30,399	$30,399	$30,399
2.2c SUPSHIP Non-CAS Personnel (Addt'l for New Const.)	**$7,997**	$800	$800	$800	$800	$800	$800	$800	$800	$800	$800
2.2d SUPSHIP Non-CAS Personnel (Addt'l for Repair)	**$43,313**	$4,331	$4,331	$4,331	$4,331	$4,331	$4,331	$4,331	$4,331	$4,331	$4,331
2.2e SUPSHIP CAS Personnel (New Const.)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2f SUPSHIP CAS Personnel (Repair)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total O&S Costs (Constant)	**$657,109**	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711
Total O&S Costs (Inflated)	**$746,241**	$67,222	$68,768	$70,350	$71,968	$73,623	$75,317	$77,049	$78,821	$80,634	$82,489
Total O&St Costs (Discounted)	**$543,747**	$63,427	$61,223	$59,096	$57,042	$55,060	$53,147	$51,300	$49,518	$47,797	$46,136
Total Investment and O&S Costs (Constant)	**$660,839**	$67,576	$67,576	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711	$65,711
Total Investment and O&S Costs (Inflated)	**$750,101**	$69,130	$70,720	$70,350	$71,968	$73,623	$75,317	$77,049	$78,821	$80,634	$82,489
Total Investment and O&S Costs (Discounted)	**$549,085**	$65,228	$64,761	$59,096	$57,042	$55,060	$53,147	$51,300	$49,518	$47,797	$46,136

SUPSHIP Alternative S-1A Risk Summary

Statistics:	Value
Trials	1,000
Mean	$557,732
Median	$556,282
Mode	---
Standard Deviation	$20,398
Variance	$416,090,752
Skewness	0.25
Kurtosis	2.48
Coefficient of Variability	0.04
Range Minimum	$513,532
Range Maximum	$614,319
Range Width	$100,787
Mean Standard Error	$645.05



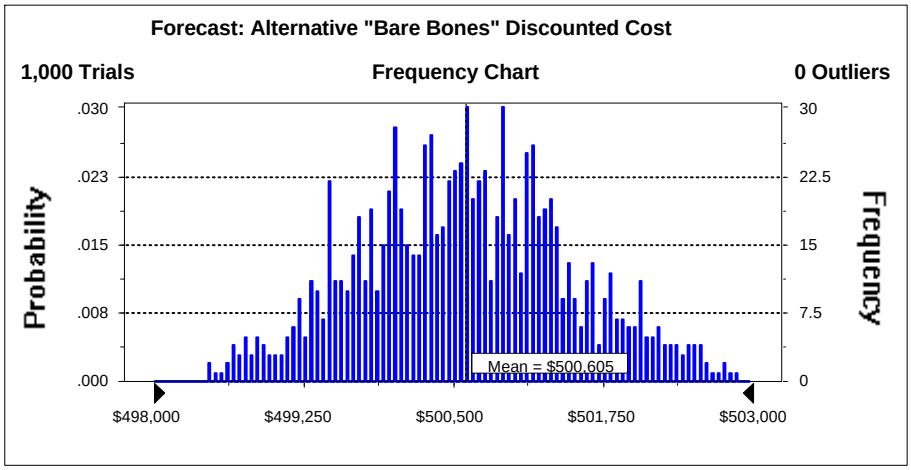
SUPSHIP Alternative "Bare Bones" Cost Summary (K$)

(SUPSHIP CAS functions transfer to DCMC, but personnel physically located at SUPSHIP)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$2,730**	$1,365	$1,365	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$3,730**	$1,865	$1,865	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$3,860**	$1,908	$1,952	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$5,338**	$1,800	$3,538	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	Included in Labor Rates in Elements 2.2a & 2.2b									
2.2 Personnel											
2.2a DCMC Personnel (Addt'l for New Const.)	**$298,161**	$29,816	$29,816	$29,816	$29,816	$29,816	$29,816	$29,816	$29,816	$29,816	$29,816
2.2b DCMC Personnel (Addt'l for Repair)	**$295,245**	$29,525	$29,525	$29,525	$29,525	$29,525	$29,525	$29,525	$29,525	$29,525	$29,525
2.2c SUPSHIP Non-CAS Personnel (Addt'l for New Const.)	**$2,146**	$215	$215	$215	$215	$215	$215	$215	$215	$215	$215
2.2d SUPSHIP Non-CAS Personnel (Addt'l for Repair)	**$2,912**	$291	$291	$291	$291	$291	$291	$291	$291	$291	$291
2.2e SUPSHIP CAS Personnel (New Const.)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2f SUPSHIP CAS Personnel (Repair)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total O&S Costs (Constant)	**$598,464**	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846
Total O&S Costs (Inflated)	**$679,641**	$61,223	$62,631	$64,071	$65,545	$67,053	$68,595	$70,173	$71,787	$73,438	$75,127
Total O&S Costs (Discounted)	**$495,219**	$57,767	$55,759	$53,822	$51,952	$50,146	$48,404	$46,722	$45,098	$43,531	$42,018
Total Investment and O&S Costs (Constant)	**$602,194**	$61,711	$61,711	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846	$59,846
Total Investment and O&S Costs (Inflated)	**$683,501**	$63,131	$64,583	$64,071	$65,545	$67,053	$68,595	$70,173	$71,787	$73,438	$75,127
Total Investment and O&S Costs (Discounted)	**$500,557**	$59,567	$59,297	$53,822	$51,952	$50,146	$48,404	$46,722	$45,098	$43,531	$42,018

SUPSHIP Bare Bones Alternative Risk Summary

Statistics:	Value
Trials	1,000
Mean	$500,605
Median	$500,601
Mode	---
Standard Deviation	$876
Variance	$768,017
Skewness	0.07
Kurtosis	2.59
Coefficient of Variability	0.00
Range Minimum	$498,475
Range Maximum	$502,877
Range Width	$4,401
Mean Standard Error	$27.71



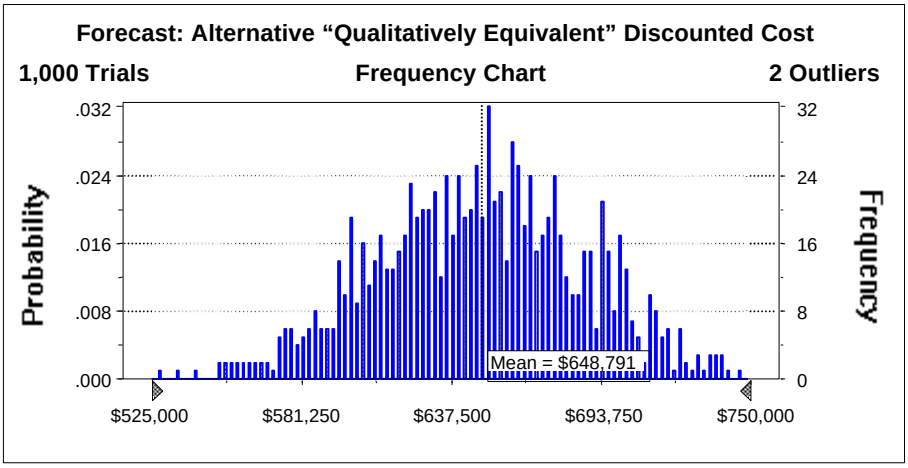
SUPSHIP Alternative "Qualitatively Equivalent" Cost Summary (K$)

(SUPSHIP CAS functions transfer to DCMC, but personnel physically located at SUPSHIP)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$2,730**	$1,365	$1,365	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$3,730**	$1,865	$1,865	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$3,860**	$1,908	$1,952	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$5,338**	$1,800	$3,538	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	Included in Labor Rates in Elements 2.2a & 2.2b									
2.2 Personnel											
2.2a DCMC Personnel (Addt'l for New Const.)	**$310,554**	$31,055	$31,055	$31,055	$31,055	$31,055	$31,055	$31,055	$31,055	$31,055	$31,055
2.2b DCMC Personnel (Addt'l for Repair)	**$352,836**	$35,284	$35,284	$35,284	$35,284	$35,284	$35,284	$35,284	$35,284	$35,284	$35,284
2.2c SUPSHIP Non-CAS Personnel (Addt'l for New Const.)	**$7,997**	$800	$800	$800	$800	$800	$800	$800	$800	$800	$800
2.2d SUPSHIP Non-CAS Personnel (Addt'l for Repair)	**$105,284**	$10,528	$10,528	$10,528	$10,528	$10,528	$10,528	$10,528	$10,528	$10,528	$10,528
2.2e SUPSHIP CAS Personnel (New Const.)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2f SUPSHIP CAS Personnel (Repair)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total O&S Costs (Constant)	**$776,670**	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667
Total O&S Costs (Inflated)	**$882,020**	$79,453	$81,281	$83,150	$85,063	$87,019	$89,021	$91,068	$93,163	$95,305	$97,497
Total O&S Costs (Discounted)	**$642,683**	$74,968	$72,363	$69,849	$67,421	$65,079	$62,817	$60,634	$58,527	$56,494	$54,530
Total Investment and O&S Costs (Constant)	**$780,400**	$79,532	$79,532	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667	$77,667
Total Investment and O&S Costs (Inflated)	**$885,880**	$81,361	$83,233	$83,150	$85,063	$87,019	$89,021	$91,068	$93,163	$95,305	$97,497
Total Investment and O&S Costs (Discounted)	**$648,021**	$76,768	$75,901	$69,849	$67,421	$65,079	$62,817	$60,634	$58,527	$56,494	$54,530

SUPSHIP "Qualitatively Equivalent" Alternative Risk Summary

Statistics:	Value
Trials	1,000
Mean	$648,781
Median	$648,383
Mode	---
Standard Deviation	$39,097
Variance	$1,528,601,001
Skewness	-0.06
Kurtosis	2.70
Coefficient of Variability	0.06
Range Minimum	$527,579
Range Maximum	$755,837
Range Width	$228,258
Mean Standard Error	$1,236.37



1 Basis of Estimate – SUPSHIP

1.1 SUPSHIP Status Quo

1.1.1 Definition:

Alternative S-SQ is defined as leaving the CAS function as the responsibility of SUPSHIP. SUPSHIP would continue to operate in the same manner as they do today. More specifically, personnel in their existing roles would accomplish the CAS, delegated CAS, and non-CAS workload.

1.1.2 Element 1.1 - Training

There are no investment costs for the status quo alternative. The personnel assigned to each SUPSHIP to accomplish the workload associated with CAS, delegated CAS, and non-CAS are trained appropriately and no additional up-front training is required.

1.1.3 Element 1.2 - System Interface Design

There are no investment costs for the status quo alternative. Each SUPSHIP information system is currently interfaced with all other necessary information systems so there are no additional up-front system interface costs.

1.1.4 Element 2.1 - Recurring Training

Recurring training costs are buried in the burdened labor rates in element 2.2e – 2.2f.

1.1.5 Element 2.2a - DCMC Personnel (Additional for New Construction)

There are no costs for this element under the status quo alternative since DCMC does not perform new construction CAS functions at SUPSHIP. There are no additional DCMC costs for new construction personnel.

1.1.6 Element 2.2b - DCMC Personnel (Additional for Repair)

There are no costs for this element under the status quo alternative since DCMC does not perform repair CAS functions at SUPSHIP. There are no additional DCMC costs for repair personnel.

1.1.7 Element 2.2c - SUPSHIP Non-CAS Personnel (Additional for New Construction)

There are no costs for this element under the status quo alternative since the existing SUPSHIP personnel satisfy the non-CAS new construction workload requirement. As such, no additional personnel are required. Existing non-CAS costs are also not captured because this analysis focuses on the CAS functions only.

1.1.8 Element 2.2d - SUPSHIP Non-CAS Personnel (Additional for Repair)

There are no costs for this element under the status quo alternative since the existing SUPSHIP personnel satisfy the non-CAS repair workload requirement. As such, no additional

personnel are required. Existing non-CAS costs are also not captured because this analysis focuses on the CAS functions only.

1.1.9 Element 2.2e - SUPSHIP CAS Personnel (New Construction)

This cost element captures the costs associated with the new construction CAS workload at the SUPSHIPs. The information is based on the 1997 SUPSHIP workload and was provided by the NAVSEA SUPSHIP Management Office.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)
Bath	61.0
Groton	57.7
Jacksonville	1.5
New Orleans	87.7
Newport News	83.8
Pascagoula	85.4
Portsmouth	0
Puget Sound	0
San Diego	29.4
Total	**406.5**

Status Quo: New Construction CAS Workload at SUPSHIP

As shown by the chart, the total CAS workload associated with new construction is 406.5 work years. The workload is estimated as a decimal since under the status quo, personnel sharing CAS and non-CAS duties perform the workload. This number was then multiplied by the average new construction/repair "burdened" annual cost per CAS personnel ($67K). We multiplied by a "burdened" cost to capture other non-personnel costs such as rent, utility, supplies, and training. This cost estimate ($27.1M) was then applied from years 2000 through 2009.

1.1.9.1 Element 2.2f - SUPSHIP CAS Personnel (Repair)

This cost element captures the costs associated with repair workload at the SUPSHIPs. The information is based on the 1997 SUPSHIP workload and was provided by the NAVSEA SUPSHIP Management Office.

SUPSHIP Facility	Repair CAS Workyears (Status Quo)
Bath	0.6
Groton	0.9
Jacksonville	56.8
New Orleans	20.7
Newport News	31.6
Pascagoula	15.9
Portsmouth	120.5
Puget Sound	25.9
San Diego	130.0
Total	**402.9**

Status Quo: Repair CAS Workload at SUPSHIP

As shown by the chart, the total CAS workload associated with repair is 402.9 work years. This number was then multiplied by the average new construction/repair "burdened" annual cost per CAS personnel ($67K). We multiplied by a "burdened" cost to capture other non-personnel costs such as rent, utility, supplies, and training. This cost estimate ($26.8M) was then applied from years 2000 through 2009.

1.2 SUPSHIP Alternative S-1A

1.2.1 Definition:

Alternative S-1A is defined as DCMC taking responsibility for the CAS functions at SUPSHIP. Under this scenario, some percentage of existing SUPSHIP employees would become DCMC employees. The SUPSHIP non-CAS workload would continue to be accomplished by SUPSHIP personnel.

1.2.2 Element 1.1 - Training

There are minimal training investment costs for Alternative S-1A. When the cadre of existing SUPSHIP personnel become DCMC employees, they are already trained to do CAS functions. Existing SUPSHIP employees will fill the non-CAS positions created as a result of transferring workload to DCMC so most of their training costs are already embedded in their burdened salaries. However, when these SUPSHIP personnel become DCMC personnel, they may be required to participate in some DCMC-specific training. We assumed that the DCMC repair personnel and the DCMC new construction CAS personnel would engage in one-time DCMC training of $3K per employee. This includes class fees, travel, and per diem and could range from $1.5K (low) to $4.5K (high). The most likely total, ~ $2.6M, was allocated across two fiscal years ($1.3M per year).

Existing SUPSHIP personnel may not fill all of the additional positions created by moving CAS to DCMC. However, for the purposes of this analysis, we assumed that the number of new hires would be small and therefore, the cost is negligible.

1.2.3 System Interface Design

There are some system interface costs that need to be captured in this alternative. Even though the new DCMC personnel do not physically relocate, to take advantage of DCMC information system synergy, the SUPSHIP CAS information systems and the DCMC CAS information systems would have to share information. Thus, this alternative must include costs for this interface. Based on the historical interface costs associated with other system interface efforts and conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis purposes and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.2.4 Element 2.1 - Recurring Training

Since existing SUPSHIP personnel assume the positions at DCMC, recurring training costs are buried in the burdened labor rates in element 2.2a – 2.2d.

1.2.5 Element 2.2a - DCMC Personnel (Additional for New Construction)

This cost element captures the DCMC personnel associated with new construction CAS workload. For purposes of this study, the Navy, using this Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that CAS personnel would increase. According to sample data and a workload analysis of the project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, CAS new construction personnel at the San Diego SUPSHIP would most likely increase to 21 personnel. The workload stays the same (20.22), but 21 personnel (instead of 20.22) are needed to perform the work now. For risk analysis purposes, 22 personnel were used as a “high estimate.” For the “low estimate”, we assumed that they will not increase at all (20.22). The following table shows the results of the project team analysis and that the overall team increases by 2.3%. Of this project team, ~47% (21/45) is CAS and ~53% (24/45) is non-CAS. Applying this ratio to the 2.3% increase, 47% of the 2.3% (1.1%) is attributable to CAS and 53% of the 2.3% (1.2%) is related to non-CAS.

Sample Data (New Construction - San Diego)

Position Title	# of People		CAS Functions	Non-CAS Functions	CAS Workyears	Non-CAS Workyears
Project Officer	1		11%	89%	0.11	0.89
CONREP	2		33%	66%	0.66	1.32
Admin. Contr. Office	7		92%	8%	6.44	0.56
Ship Manager	4		30%	70%	1.2	2.8
Engineering/Design	3		40%	60%	1.2	1.8
Surveyors	2		35%	65%	0.7	1.3
QA	3		100%	0%	3	0
Material	12		13%	87%	1.56	10.44
ILS	2		10%	90%	0.2	1.8
Progress/Business Rev	3		85%	15%	2.55	0.45
Config Control/Funds	2		85%	15%	1.7	0.3
Finance	1		90%	10%	0.9	0.1
Staff Support	2		0%	100%	0	2
Status Quo Staff Level	**44.0**				**20.22**	**23.76**
		Total % Increase	**CAS % Increase**	**Non-CAS % Increase**		
Alternative S-1A Staff Level (Most Likely)	**45.0**	**2.3%**	**1.1%**	**1.2%**	**21.0**	**24.0**
Alternative S-1A Staff Level (Low)	**44.0**	**0.0%**	**0.0%**	**0.0%**	**20.22**	**23.76**
Alternative S-1A Staff Level (High)	**47.0**	**6.8%**	**3.2%**	**3.6%**	**22.0**	**25.0**

Comparison of Number of New Construction CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

In element 2.2e of the status quo alternative, we identified a workload of 406.5 work years for CAS new construction. If we extrapolate the most likely project team ratio (20.22 personnel to 21 personnel) and increase CAS, new construction personnel by 1.1% (most likely) across all of the SUPSHIPs, the total CAS personnel associated with new construction becomes 410.8. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 414 for an increase of 1.8%.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	New Construction CAS Workyears (Alt. S-1A, Partial)	New Construction CAS Workyears (Alt S-1A, Full)
Bath	61.0	61.6	62.0
Groton	57.7	58.3	59.0
Jacksonville	1.5	1.5	2.0
New Orleans	87.7	88.6	89.0
Newport News	83.8	84.7	85.0
Pascagoula	85.4	86.3	87.0
Portsmouth	0	0.0	0.0
Puget Sound	0	0.0	0.0
San Diego	29.4	29.7	30.0
Total	**406.5**	**410.8**	**414.0**
Percentage Increase		**1.1%**	**1.8%**

Comparison of Number of New Construction CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are now DCMC employees, we multiplied the personnel (414) times the average unburdened SUPSHIP salary ($41K) times the DCMC burden factor (1.8) to calculate an annual cost. We used the DCMC burden factor because these personnel are now DCMC employees. This totals $30.2M per year. We extended this cost from 2000 through 2009.

1.2.6 Element 2.2b - DCMC Personnel (Additional for Repair)

Like element 2.2a, this cost element captures the DCMC personnel associated with repair CAS workload. For purposes of this study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that CAS personnel would increase. According to sample data and a workload analysis of the project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, CAS repair personnel at the San Diego SUPSHIP would most likely increase to 4 personnel. The workload stays the same (3.35), but 4 personnel (instead of 3.35) are needed to perform the work now. For risk analysis purposes, 5 personnel were used as a "high estimate." For the "low estimate", we assumed no increase at all (3.35). The following table shows the results of the project team analysis, and that the overall team increases by 7.7%. In this project team, ~29% (4/14) is CAS and ~71% (10/14) is non-CAS. Applying this ratio to the 7.7% increase, 29% of the 7.7% (2.2%) is attributable to CAS and 71% of the 7.7% (5.5%) is related to non-CAS.

Nine Week Availability Sample Data (Repair - San Diego)

Position Title	# of People		CAS Functions	Non-CAS Functions	CAS Workyears	Non-CAS Workyears
Ship Superintendent	1		0%	100%	0	1
Admin. Contr. Officer	1		30%	70%	0.3	0.7
Program Manager	1		10%	90%	0.1	0.9
SBS (Trade Specific)	4		30%	70%	1.2	2.8
Quality Assurance	1		80%	20%	0.8	0.2
Material	1		5%	95%	0.05	0.95
Finance	1		10%	90%	0.1	0.9
Safety/Environment	1		60%	40%	0.6	0.4
Barge Representative	1		10%	90%	0.1	0.9
Design	1		10%	90%	0.1	0.9
Status Quo Staff Level	**13.0**				**3.35**	**9.65**
		Total % Increase	**CAS % Increase**	**Non-CAS % Increase**		
Alternative S-1A Staff Level (Most Likely)	**14.0**	**7.7%**	**2.2%**	**5.5%**	**4.0**	**10.0**
Alternative S-1A Staff Level (Low)	**13.0**	**0.0%**	**0.0%**	**0.0%**	**3.35**	**9.65**
Alternative S-1A Staff Level (High)	**16.0**	**23.1%**	**7.2%**	**15.9%**	**5.0**	**11.0**

Comparison of Number of Repair CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

In element 2.2f of the status quo alternative, we identified a workload of 402.9 work years for repair CAS. If we extrapolate the most likely project team ratio (3.35 personnel to 4 personnel) and increase CAS repair personnel by 2.2% (most likely) across all of the SUPSHIPs, the total CAS personnel associated with repair becomes 411.8. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 417 for an increase of 3.5%.

SUPSHIP Facility	Repair CAS Workyears (Status Quo)	Repair CAS Workyears (Alt. S-1A, Partial)	Repair CAS Workyears (Alt S-1A, Full)
Bath	0.6	0.6	1.0
Groton	0.9	0.9	1.0
Jacksonville	56.8	58.0	59.0
New Orleans	20.7	21.2	22.0
Newport News	31.6	32.3	33.0
Pascagoula	15.9	16.2	17.0
Portsmouth	120.5	123.1	124.0
Puget Sound	25.9	26.5	27.0
San Diego	130	132.9	133.0
Total	**402.9**	**411.8**	**417.0**
Percentage Increase		**2.2%**	**3.5%**

Comparison of Number of Repair CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are now DCMC employees, we multiplied the number of personnel (417) times the average unburdened SUPSHIP salary ($41K) times the DCMC burden factor (1.8) to calculate an annual cost. We used the DCMC burden factor because these personnel are now DCMC employees. This totals $30.4M per year. We extended this cost from 2000 through 2009.

1.2.7 Element 2.2c – SUPSHIP Non-CAS Personnel (Additional for New Construction)

This cost element captures the additional personnel associated with new construction, non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. As described in the main document, many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would need to add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD for mission performance so we allocate additional costs for these positions in this cost element.

For purposes of this study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that the new construction non-CAS personnel would also increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, non-CAS new construction personnel at the San Diego SUPSHIP would most likely increase to 24 personnel. The workload stays the same (23.76), but 24 personnel (instead of 23.76) are needed to perform the work now. For risk analysis purposes, 25 personnel were used as a “high estimate.” For the “low estimate”, we assumed that they will not increase at all (23.76). The following table shows the results of the project team analysis, and that the overall team increases by 2.3%. In this project team, ~47% (21/45) is CAS and ~53% (24/45) is non-CAS. Applying this ratio to the 2.3% increase, 47% of the 2.3% (1.1%) is attributable to CAS and 53% of the 2.3% increase (1.2%) is related to non-CAS.

Sample Data (New Construction - San Diego)

Position Title	# of People		CAS Functions	Non-CAS Functions	CAS Workyears	Non-CAS Workyears
Project Officer	1		11%	89%	0.11	0.89
CONREP	2		33%	66%	0.66	1.32
Admin. Contr. Office	7		92%	8%	6.44	0.56
Ship Manager	4		30%	70%	1.2	2.8
Engineering/Design	3		40%	60%	1.2	1.8
Surveyors	2		35%	65%	0.7	1.3
QA	3		100%	0%	3	0
Material	12		13%	87%	1.56	10.44
ILS	2		10%	90%	0.2	1.8
Progress/Business Rev	3		85%	15%	2.55	0.45
Config Control/Funds	2		85%	15%	1.7	0.3
Finance	1		90%	10%	0.9	0.1
Staff Support	2		0%	100%	0	2
Status Quo Staff Level	**44.0**				**20.22**	**23.76**
		Total % Increase	**CAS % Increase**	**Non-CAS % Increase**		
Alternative S-1A Staff Level (Most Likely)	**45.0**	**2.3%**	**1.1%**	**1.2%**	**21.0**	**24.0**
Alternative S-1A Staff Level (Low)	**44.0**	**0.0%**	**0.0%**	**0.0%**	**20.22**	**23.76**
Alternative S-1A Staff Level (High)	**47.0**	**6.8%**	**3.2%**	**3.6%**	**22.0**	**25.0**

Comparison of Number of New Construction Non-CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

If we extrapolate the most likely project team ratio (23.76 personnel to 24 personnel) and increase non-CAS, new construction personnel by 1.2% (most likely) across all of the SUPSHIPs, the additional non-CAS personnel associated with new construction is 9.1. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 12 for an increase of 1.6%.

SUPSHIP Facility	Total CAS Del and Non-CAS New Construction Workyears (Status Quo)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Partial)	Additional Non-CAS New Construction Workyears (Alt S-1A, Full)
Bath	111.6	1.4	2.0
Groton	137.4	1.7	2.0
Jacksonville	0.9	0.0	1.0
New Orleans	147.4	1.8	2.0
Newport News	156.9	1.9	2.0
Pascagoula	155.4	1.9	2.0
Portsmouth	0.0	0.0	0.0
Puget Sound	0.0	0.0	0.0
San Diego	43.2	0.5	1.0
Total	**752.8**	**9.1**	**12.0**
Percentage Increase		**1.2%**	**1.6%**

Comparison of Number of New Construction Non-CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (12) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel would be SUPSHIP employees. This totals $800K per year. We extended this cost from 2000 through 2009.

1.2.8 Element 2.2d – SUPSHIP Non-CAS Personnel (Additional for Repair)

This cost element captures the additional personnel associated with repair non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. As described in the main document, many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would need to add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD so we allocate additional costs for these positions in this cost element.

For purposes of the study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that the repair non-CAS personnel would also increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, non-CAS repair personnel at the San Diego SUPSHIP would most likely increase.

The workload stays the same (9.65), but 10 personnel (instead of 9.65) are needed to perform the work now. For risk analysis purposes, 11 personnel were used as a “high estimate.” For the “low estimate”, we assumed that they will not increase at all (9.65). The following table shows the results of the project team analysis, and that the overall team increases by 7.7%. In this project team, ~29% (4/14) is CAS and ~71% (10/14) is non-CAS. Applying this ratio to the 7.7% increase, 29% of the 7.7% (2.2%) is attributable to CAS and 71% of the 7.7% (5.5%) is related to non-CAS.

Nine Week Availability Sample Data (Repair - San Diego)

Position Title	# of People		CAS Functions	Non-CAS Functions	CAS Workyears	Non-CAS Workyears
Ship Superintendent	1		0%	100%	0	1
Admin. Contr. Officer	1		30%	70%	0.3	0.7
Program Manager	1		10%	90%	0.1	0.9
SBS (Trade Specific)	4		30%	70%	1.2	2.8
Quality Assurance	1		80%	20%	0.8	0.2
Material	1		5%	95%	0.05	0.95
Finance	1		10%	90%	0.1	0.9
Safety/Environment	1		60%	40%	0.6	0.4
Barge Representative	1		10%	90%	0.1	0.9
Design	1		10%	90%	0.1	0.9
Status Quo Staff Level	**13.0**				**3.35**	**9.65**
		Total % Increase	**CAS % Increase**	**Non-CAS % Increase**		
Alternative S-1A Staff Level (Most Likely)	**14.0**	**7.7%**	**2.2%**	**5.5%**	**4.0**	**10.0**
Alternative S-1A Staff Level (Low)	**13.0**	**0.0%**	**0.0%**	**0.0%**	**3.35**	**9.65**
Alternative S-1A Staff Level (High)	**16.0**	**23.1%**	**7.2%**	**15.9%**	**5.0**	**11.0**

Comparison of Number of Repair Non-CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

If we extrapolate the most likely project team ratio (9.65 personnel to 10 personnel) and increase personnel by 5.5% (most likely) across all of the SUPSHIPs, the additional non-CAS personnel associated with repair is 60.6. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 65 for an increase of 5.9%.

SUPSHIP Facility	Total CAS Del and Non-CAS Repair Workyears (Status Quo)	Additional Non-CAS Repair Workyears (Alt. S-1A, Partial)	Additional Non-CAS Repair Workyears (Alt S-1A, Full)
Bath	44.8	2.5	3.0
Groton	14.4	0.8	1.0
Jacksonville	120.5	6.6	7.0
New Orleans	34.2	1.9	2.0
Newport News	113.7	6.2	7.0
Pascagoula	75.3	4.1	5.0
Portsmouth	296.5	16.3	17.0
Puget Sound	75.7	4.2	5.0
San Diego	327.6	18.0	18.0
Total	**1,102.6**	**60.6**	**65.0**
Percentage Increase		**5.5%**	**5.9%**

Comparison of Number of Repair Non-CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (65) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel will be SUPSHIP employees. This totals $4.3M per year. We extended this cost from 2000 through 2009.

1.2.9 Element 2.2e – SUPSHIP CAS Personnel (New Construction)

There are no costs under this element for this alternative since the new construction CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2a.

1.2.10 Element 2.2f – SUPSHIP CAS Personnel (Repair)

There are no costs under this element for this alternative since the repair CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2b.

1.3 SUPSHIP "Qualitatively Equal" Alternative

1.3.1 Definition:

The "Qualitatively Equal" alternative is defined as DCMC taking responsibility for the CAS functions at SUPSHIP. Under this scenario, some percentage of existing SUPSHIP employees would become DCMC employees. The SUPSHIP non-CAS workload would continue to be accomplished by SUPSHIP personnel. The number of DCMC CAS billets and SUPSHIP non-CAS billets would be increased to provide a level of service and responsiveness projected to equal that in the current scenario. The analysis for this alternative is provided in Appendix B.

1.3.2 Element 1.1 - Training

There are minimal training investment costs for this alternative. When the cadre of existing SUPSHIP personnel become DCMC employees, they are already trained to do CAS functions. However, when these SUPSHIP personnel become DCMC personnel, they may be required to participate in some DCMC-specific training. We assumed that the DCMC repair personnel and the DCMC new construction personnel would engage in one-time DCMC training

of $3K per person. This includes class fees, travel, and per diem and it could range from $1.5K (low) to $4.5K (high). This totals ~ $2.6M which was allocated across two fiscal years ($1.3M per year).

Existing SUPSHIP personnel may not fill all of the additional positions created by moving CAS to DCMC. However, for the purposes of this analysis, we assumed that the number of new hires would be small and therefore, the cost is negligible.

1.3.3 Element 1.2 - System Interface Design

There are some system interface costs that need to be captured in this alternative. Even though the new DCMC personnel do not physically relocate, to take advantage of DCMC information system synergy, the SUPSHIP CAS information systems and the DCMC CAS information systems would have to be able to exchange data. Thus, this alternative must include costs for this interface. Based on the historical interface costs associated with previous system interfaces and conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis purposes and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.3.4 Element 2.1 - Recurring Training

Since existing SUPSHIP personnel assume the positions at DCMC, recurring training costs are buried in the burdened labor rates in element 2.2a – 2.2d. Similarly, existing SUPSHIP personnel assume the new non-CAS positions. Their recurring training is also included in their burdened rates.

1.3.5 Element 2.2a - DCMC Personnel (Additional for New Construction)

This cost element captures the DCMC personnel associated with new construction CAS workload. For purposes of the study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that CAS personnel would increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, CAS new construction personnel at the San Diego SUPSHIP would most likely increase to 21 personnel. The workload stays the same (20.22), but 21 personnel (instead of 20.22) are needed to perform the work now. For risk analysis purposes, 22 personnel were used as a “high estimate.” For the “low estimate”, we assumed that they will not increase at all (20.22). The following table shows the results of the project team analysis.

Sample Data (New Construction - San Diego)

Position Title	# of People	CAS Functions	Non-CAS Functions	CAS Workyears
Project Officer	1	11%	89%	0.11
CONREP	2	33%	66%	0.66
Admin. Contr. Office	7	92%	8%	6.44
Ship Manager	4	30%	70%	1.2
Engineering/Design	3	40%	60%	1.2
Surveyors	2	35%	65%	0.7
QA	3	100%	0%	3
Material	12	13%	87%	1.56
ILS	2	10%	90%	0.2
Progress/Business Rev	3	85%	15%	2.55
Config Control/Funds	2	85%	15%	1.7
Finance	1	90%	10%	0.9
Staff Support	2	0%	100%	0
Status Quo Staff Level	**44**			**20.22**
Alternative S-1A Staff Level (Most Likely)				**21**
Alternative S-1A Staff Level (Low)				**20.22**
Alternative S-1A Staff Level (High)				**22**

Comparison of Number of New Construction CAS Personnel for the Status Quo and Alternative S-1A – Sample Data

In element 2.2e of the status quo alternative, we identified a work load of 406.5 work years for CAS new construction. If we extrapolate the most likely project team ratio (20.22 personnel to 21 personnel) and increase personnel by 3.9% (most likely) across all of the SUPSHIPs, the total CAS personnel associated with new construction becomes 422.2. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 426 for an increase of 4.8%.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	New Construction CAS Workyears (Alt. S-1A, Partial)	New Construction CAS Workyears (Alt S-1A, Full)
Bath	61.0	63.4	64
Groton	57.0	59.9	60
Jacksonville	1.5	1.6	2
New Orleans	87.7	91.1	92
Newport News	83.8	87.0	88
Pascagoula	85.4	88.7	89
Portsmouth	0	0	0
Puget Sound	0	0	0
San Diego	29.4	30.5	31
Total		**422.2**	**426.0**
Percentage Increase		**3.9%**	**4.8%**

Comparison of Number of New Construction CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are now DCMC employees, we multiplied the number of personnel (426) by the average unburdened SUPSHIP salary ($41K) then by the DCMC burden factor (1.8) to calculate the annual cost. The DCMC burden factor was used since these personnel are DCMC employees. The total is $31.1M per year. These costs were extended from 2000 to 2009.

1.3.6 Element 2.2b - DCMC Personnel (Additional for Repair)

Like element 2.2a, this cost element captures the DCMC personnel associated with repair CAS workload. For purposes of this study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that CAS personnel would increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, CAS repair personnel at the San Diego SUPSHIP would most likely increase to 4 personnel. The workload stays the same (3.35), but 4 personnel (instead of 3.35) are needed to perform the work now. For risk analysis purposes, 5 personnel were used as a "high estimate." For the "low estimate", we assumed that they will not increase at all (3.35). The following table show the results of the project team analysis.

Nine Week Availability Sample Data (Repair - San Diego)

Position Title	# of People	CAS Functions	Non-CAS Functions	CAS Workyears
Ship Superintendent	1	0%	100%	0
Admin. Contr. Officer	1	30%	70%	0.3
Program Manager	1	10%	90%	0.1
SBS (Trade Specific)	4	30%	70%	1.2
Quality Assurance	1	80%	20%	0.8
Material	1	5%	95%	0.05
Finance	1	10%	90%	0.1
Safety/Environment	1	60%	40%	0.6
Barge Representative	1	10%	90%	0.1
Design	1	10%	90%	0.1
Status Quo Staff Level	**13.0**			**3.35**
Alternative S-1A Staff Level (Most Likely)				**4**
Alternative S-1A Staff Level (Low)				**3.35**
Alternative S-1A Staff Level (High)				**5**

Comparison of Number of Repair CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

In element 2.2f of the status quo alternative, we identified a workload of 402.9 work years for repair CAS. If we extrapolate the most likely project team ratio (3.35 personnel to 4 personnel) and increase personnel by 19.4% (most likely) across all of the SUPSHIPs, the total CAS personnel associated with repair becomes 481.1. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 484 for an increase of 20.1%.

SUPSHIP Facility	Repair CAS Workyears (Status Quo)	Repair CAS Workyears (Alt. S-1A, Partial)	Repair CAS Workyears (Alt S-1A, Full)
Bath	0.6	0.7	1.0
Groton	0.9	1.1	2.0
Jacksonville	56.8	67.8	68
New Orleans	20.7	24.7	25
Newport News	31.6	37.7	38
Pascagoula	15.9	19.0	19
Portsmouth	120.5	143.9	144
Puget Sound	25.9	30.9	31
San Diego	130	155.2	156
Total	**402.9**	**481.1**	**48**
Percentage Increase		**19.4%**	**20.1%**

Comparison of Number of Repair CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are now DCMC employees, we multiplied the number of personnel (484) times the average unburdened SUPSHIP salary ($41K) times the DCMC burden factor (1.8) to calculate an annual cost. We used the DCMC burden factor because these personnel are now DCMC employees. This totals $35.3M per year. We extended this cost from 2000 through 2009.

1.3.7 Element 2.2c – SUPSHIP Non-CAS Personnel (Additional for New Construction)

This cost element captures the additional personnel associated with new construction, non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. Many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD so we allocate additional costs for these positions in this cost element.

For purposes of the study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that non-CAS personnel would also increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, non-CAS new construction personnel at the San Diego SUPSHIP would most likely increase to 24 personnel. The workload stays the same (23.76), but 24 personnel (instead of 23.76) are needed to perform the work now. For risk analysis purposes, 25 personnel were used as a "high estimate." For the "low estimate", we assumed that they will not increase at all (23.76). The following table shows the results of the project team analysis.

Sample Data (New Construction - San Diego)

Position Title	# of People	CAS Functions	Non-CAS Functions	Non-CAS Workyears
Project Officer	1	11%	89%	0.89
CONREP	2	33%	66%	1.32
Admin. Contr. Office	7	92%	8%	0.56
Ship Manager	4	30%	70%	2.8
Engineering/Design	3	40%	60%	1.8
Surveyors	2	35%	65%	1.3
QA	3	100%	0%	0
Material	12	13%	87%	10.44
ILS	2	10%	90%	1.8
Progress/Business Rev	3	85%	15%	0.45
Config Control/Funds	2	85%	15%	0.3
Finance	1	90%	10%	0.1
Staff Support	2	0%	100%	2
Status Quo Staff Level	**44**			**23.76**
Alternative S-1A Staff Level (Most Likely)				**24**
Alternative S-1A Staff Level (Low)				**23.76**
Alternative S-1A Staff Level (High)				**25**

Comparison of Number of New Construction Non-CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

If we extrapolate the most likely project team ratio (23.76 personnel to 24 personnel) and increase personnel by 1.0% (most likely) across all of the SUPSHIPs, the additional non-CAS personnel associated with new construction is 7.6. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 12 for an increase of 1.6%.

SUPSHIP Facility	Total CAS Del and Non-CAS New Construction Workyears (Status Quo)	Additional Non-CAS New Construction Workyears (Alt. S-1A, Partial)	Additional Non-CAS New Construction Workyears (Alt S-1A, Full)
Bath	111.6	1.1	2.0
Groton	137.44	1.4	2.0
Jacksonville	0.86	0.0	1.0
New Orleans	147.42	1.5	2.0
Newport News	156.91	1.6	2.0
Pascagoula	155.4	1.6	2.0
Portsmouth	0	0.0	0.0
Puget Sound	0	0.0	0.0
San Diego	43.15	0.4	1.0
Total	**7,522.78**	**7.6**	**12**
Percentage Increase		**1.0%**	**1.6**

Comparison of Number of New Construction Non-CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (12) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel are still SUPSHIP employees. This totals $800K per year. We extended this cost from 2000 through 2009.

1.3.8 Element 2.2d – SUPSHIP Non-CAS Personnel (Additional for Repair)

This cost element captures the additional personnel associated with repair non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. Many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD so we allocate additional costs for these positions in this cost element.

For purposes of the study, the Navy, using the Project Team structure as the basis, analyzed the impact of the CAS function transfer to DCMC and determined that non-CAS personnel would also increase. According to sample data and a workload analysis project team identified by the NAVSEA SUPSHIP Management Office, if the CAS function were moved from SUPSHIP to DCMC, non-CAS repair personnel at the San Diego SUPSHIP would most likely increase to 11 personnel. The workload stays the same (9.65), but 11 personnel (instead of 9.65) are needed to perform the work now. For risk analysis purposes, 12 personnel were used as a "high estimate." For the "low estimate", we assumed that they will not increase at all (9.65). The following table show the results of the project team analysis.

Nine Week Availability Sample Data (Repair - San Diego)

Position Title	# of People	CAS Functions	Non-CAS Functions	Non-CAS Workyears
Ship Superintendent	1	0%	100%	1
Admin. Contr. Officer	1	30%	70%	0.7
Program Manager	1	10%	90%	0.9
SBS (Trade Specific)	4	30%	70%	2.8
Quality Assurance	1	80%	20%	0.2
Material	1	5%	95%	0.95
Finance	1	10%	90%	0.9
Safety/Environment	1	60%	40%	0.4
Barge Representative	1	10%	90%	0.9
Design	1	10%	90%	0.9
Status Quo Staff Level	**13.0**			**9.65**
Alternative S-1A Staff Level (Most Likely)				**11**
Alternative S-1A Staff Level (Low)				**9.65**
Alternative S-1A Staff Level (High)				**12**

Comparison of Number of Repair Non-CAS Personnel at San Diego for the Status Quo and Alternative S-1A – Sample Data

If we extrapolate the most likely project team ratio (9.65 personnel to 11 personnel) and increase personnel by 14% (most likely) across all of the SUPSHIPs, the additional non-CAS personnel associated with new construction is 154.3. However, we need to round the partial personnel to whole personnel to get an accurate representation of headcount. This total is 158 for an increase of 14.3%.

SUPSHIP Facility	Total CAS Del and Non-CAS Repair Workyears (Status Quo)	Additional Non-CAS Repair Workyears (Alt. S-1A, Partial)	Additional Non-CAS Repair Workyears (Alt S-1A, Full)
Bath	44.8	6.3	7.0
Groton	14.47	2.0	3.0
Jacksonville	120.54	16.9	17.0
New Orleans	34.18	4.8	5.0
Newport News	113.69	15.9	16.0
Pascagoula	75.3	10.5	11.0
Portsmouth	296.5	41.5	42.0
Puget Sound	75.7	10.6	11.0
San Diego	327.55	45.8	46.0
Total	**1,102.63**	**154.3**	**158.0**
Percentage Increase		**14%**	**14.3%**

Comparison of Number of Repair Non-CAS Personnel for the Status Quo and Alternative S-1A

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (158) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel are still SUPSHIP employees. This totals $10.5M per year. We extended this cost from 2000 through 2009.

1.3.9 Element 2.2e – SUPSHIP CAS Personnel (New Construction)

There are no costs under this element for this alternative since the new construction CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2a.

1.3.10 Element 2.2f – SUPSHIP CAS Personnel (Repair)

There are no costs under this element for this alternative since the active repair CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2b.

1.4 SUPSHIP "Bare Bones" Alternative

1.4.1 Definition:

Alternative "Bare Bones" is defined as DCMC taking responsibility for the CAS functions at SUPSHIP with the transfer of some percentage of existing SUPSHIP employees to DCMC. No employees, beyond the minimum required to achieve whole-person rounding, would be added to the SUPSHIP-DCMC mix to compensate for the lost synergy of the integrated CAS/non-CAS personnel who currently make up the SUPSHIP project teams. The SUPSHIP non-CAS workload would continue to be accomplished by SUPSHIP personnel.

1.4.2 Element 1.1 - Training

There are minimal training investment costs for the Bare Bones Alternative. When the cadre of existing SUPSHIP personnel become DCMC employees, they are already trained to do CAS functions. However, when these SUPSHIP personnel become DCMC personnel, they may be required to participate in some DCMC-specific training. We assumed that the DCMC repair personnel and the DCMC new construction personnel would engage in one-time DCMC training of $3K. This includes class fees, travel, and per diem and it could range from $1.5K (low) to $4.5K (high). This totals ~ $2.6M which was allocated across two fiscal years ($1.3M per year).

Existing SUPSHIP personnel may not fill all of the additional positions created by moving CAS to DCMC. However, for the purposes of this analysis, we assumed that the number of new hires would be small and therefore, the cost is negligible.

1.4.3 Element 1.2 - System Interface Design

There are some system interface costs that need to be captured in this alternative. Even though the new DCMC personnel do not physically relocate, to take advantage of DCMC information system synergy, the SUPSHIP CAS information systems and the DCMC CAS information systems would need to be able to exchange data. Thus, this alternative must include costs for this interface. Based on the historical interface costs associated with previous system interfaces and conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis purposes and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.4.4 Element 2.1 - Recurring Training

Since existing SUPSHIP personnel assume the positions at DCMC, recurring training costs are buried in the burdened labor rates in element 2.2a – 2.2d.

1.4.5 Element 2.2a - DCMC Personnel (Additional for New Construction)

This cost element captures the DCMC personnel associated with new construction CAS workload. For the Bare Bones Alternative, we assumed that if the CAS function were transferred to DCMC, the number of new construction CAS staff would increase only slightly as a result of rounding to whole bodies at the SUPSHIP locations.

SUPSHIP Facility	New Construction CAS Workyears (Status Quo)	New Construction CAS Workyears Bare Bones)
Bath	61.0	61.0
Groton	57.7	58.0
Jacksonville	1.5	2.0
New Orleans	87.7	88.0
Newport News	83.8	84.0
Pascagoula	85.4	86.0
Portsmouth	0	0.0
Puget Sound	0	0.0
San Diego	29.4.0	30.0
Total	**406.5**	**409.0**
Percentage Increase		**0.6%**

Comparison of Number of New Construction CAS Personnel for the Status Quo and Bare Bones Alternative – Sample Data

In element 2.2e of the status quo alternative, we identified a work load of 406.5 work years for CAS new construction. If we use the Bare Bones methodology, new construction CAS personnel increase by .6% across all of the SUPSHIPs, and the total CAS personnel associated with new construction becomes 409.

Since these personnel are now DCMC employees, we multiplied the number of personnel (409) times the average unburdened SUPSHIP salary ($41K) times the DCMC burden factor (1.8) to calculate an annual cost. We used the DCMC burden factor because these personnel are now DCMC employees. This totals $29.8M per year. We extended this cost from 2000 through 2009.

1.4.6 Element 2.2b - DCMC Personnel (Additional for Repair)

Like element 2.2a, this cost element captures the DCMC personnel associated with repair CAS workload. For the Bare Bones Alternative, we assumed that if the CAS function were transferred to DCMC, the number of repair CAS staff would increase only slightly as a result of rounding to whole bodies at the SUPSHIP locations.

SUPSHIP Facility	Repair CAS Workyears (Status Quo)	Repair CAS Workyears Bare Bones)
Bath	0.6	1
Groton	0.9	1
Jacksonville	56.8	57
New Orleans	20.7	21
Newport News	31.6	32
Pascagoula	15.9	16
Portsmouth	120.5	121
Puget Sound	25.9	26
San Diego	130	130
Total	**402.9**	**405.0**
Percentage Increase		**0.5%**

Comparison of Number of Repair CAS Personnel for the Status Quo and Bare Bones Alternative – Sample Data

In element 2.2f of the status quo alternative, we identified a workload of 402.9 work years for repair CAS. If we use the Bare Bones methodology, repair CAS personnel increase by .5% across all of the SUPSHIPs, and the total CAS personnel associated with new construction becomes 405.

Since these personnel are now DCMC employees, we multiplied the number of personnel (405) times the average unburdened SUPSHIP salary ($41K) times the DCMC burden factor (1.8) to calculate an annual cost. We used the DCMC burden factor because these personnel are now DCMC employees. This totals $29.5M per year. We extended this cost from 2000 through 2009.

1.4.7 Element 2.2c – SUPSHIP Non-CAS Personnel (Additional for New Construction)

This cost element captures the additional personnel associated with new construction, non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. As described in the main document many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD for mission performance so we allocate additional costs for these positions in this cost element.

For the Bare Bones Alternative, we assumed that if the CAS function were transferred to DCMC, the number of new construction non-CAS staff would increase only slightly as a result of rounding to whole bodies at the SUPSHIP locations.

SUPSHIP Facility	Total CAS Del and Non-CAS New Construction Workyears (Status Quo)	Total Non-CAS New Construction Workyears (Bare Bones)	Additional Non-CAS New Construction Workyears (Bare Bones)
Bath	111.6	112.0	0.4
Groton	137.4	138.0	0.6
Jacksonville	0.9	1.0	0.1
New Orleans	147.4	148.0	0.6
Newport News	156.9	157.0	0.1
Pascagoula	155.4	156.0	0.6
Portsmouth	0.0	0.0	0.0
Puget Sound	0.0	0.0	0.0
San Diego	43.2	44.0	0.9
Total	**752.8**	**756.0**	**3.2**
Percentage Increase		**0.4%**	

Comparison of Number of New Construction Non-CAS Personnel for the Status Quo and Bare Bones Alternative – Sample Data

If we use the Bare Bones methodology, new construction non-CAS personnel increase by .4% across all of the SUPSHIPs, and the additional non-CAS personnel associated with new construction becomes 3.2.

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (3.2) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel are still SUPSHIP employees. This totals $215K per year. We extended this cost from 2000 through 2009.

1.4.8 Element 2.2d – SUPSHIP Non-CAS Personnel (Additional for Repair)

This cost element captures the additional personnel associated with repair, non-CAS functions at SUPSHIP if the CAS functions were transferred to DCMC. As described in the main document many of the personnel at the SUPSHIP facilities share both CAS and non-CAS functions. Therefore, if certain predominantly CAS personnel become DCMC employees, their formerly non-CAS workload must still be fulfilled. To fill these positions, SUPSHIP would need to add billets as necessary. Even though these are non-CAS positions, the analysis captures the total effect on the DoD so we allocate additional costs for these positions in this cost element.

For the Bare Bones Alternative, we assumed that if the CAS function were transferred to DCMC, the number of repair non-CAS staff would increase only slightly as a result of rounding to whole bodies at the SUPSHIP locations.

SUPSHIP Facility	Total CAS Del and Non-CAS Repair Workyears (Status Quo)	Total Non-CAS Repair Workyears (Bare Bones)	Additional Non-CAS Repair Workyears (Bare Bones)
Bath	44.8	45	0.2
Groton	14.4	15	0.6
Jacksonville	120.5	121	0.5
New Orleans	34.2	35	0.8
Newport News	113.7	114	0.3
Pascagoula	75.3	76	0.7
Portsmouth	296.5	297	0.5
Puget Sound	75.7	76	0.3
San Diego	327.6	328	0.4
Total	**1,102.6**	**1,107.0**	**4.4**
Percentage Increase		**0.4%**	

Comparison of Number of Repair Non-CAS Personnel for the Status Quo and Bare Bones Alternative – Sample Data

If we use the Bare Bones methodology, repair non-CAS personnel increase by .4% across all of the SUPSHIPs, and the additional non-CAS personnel associated with new construction becomes 4.4.

Since these personnel are still SUPSHIP employees, we multiplied the number of personnel (4.4) times the average burdened SUPSHIP salary ($67K) to calculate an annual cost. We used the SUPSHIP burden factor because these personnel are still SUPSHIP employees. This totals $291K per year. We extended this cost from 2000 through 2009.

1.4.9 Element 2.2e – SUPSHIP CAS Personnel (New Construction)

There are no costs under this element for this alternative since the new construction CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2a.

1.4.10 Element 2.2f – SUPSHIP CAS Personnel (Repair)

There are no costs under this element for this alternative since the repair CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2b.

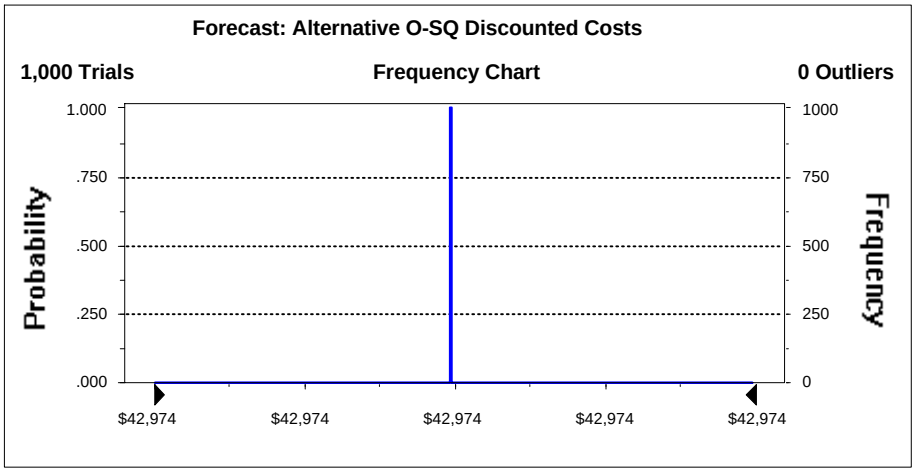
Appendix F: ONR Detailed Cost Estimate and Basis of Cost Estimate

ONR Status Quo Cost Summary (K$)
(ONR retain CAS functions)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	Included in Labor Rate in Elements 2.2b									
2.2 Personnel Costs											
2.2a DCMC Personnel	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2b ONR CAS Personnel	**$50,649**	$6,462	$6,236	$6,018	$5,807	$5,604	$5,408	$5,219	$5,036	$4,860	$4,690
Total O&S Costs (Constant)	**$50,649**	$6,462	$6,236	$6,018	$5,807	$5,604	$5,408	$5,219	$5,036	$4,860	$4,690
Total O&S Costs (Inflated)	**$56,540**	$6,611	$6,526	$6,443	$6,360	$6,279	$6,198	$6,119	$6,041	$5,963	$5,887
Total O&S Costs (Discounted)	**$42,974**	$6,238	$5,810	$5,412	$5,041	$4,696	$4,374	$4,074	$3,795	$3,535	$3,293
Total Investment and O&S Costs (Constant)	**$50,649**	$6,462	$6,236	$6,018	$5,807	$5,604	$5,408	$5,219	$5,036	$4,860	$4,690
Total Investment and O&S Costs (Inflated)	**$56,540**	$6,611	$6,526	$6,443	$6,360	$6,279	$6,198	$6,119	$6,041	$5,963	$5,887
Total Investment and O&S Costs (Discounted)	**$42,974**	$6,238	$5,810	$5,412	$5,041	$4,696	$4,374	$4,074	$3,795	$3,535	$3,293

ONR Status Quo Risk Summary

Statistics:	Value
Trials	1,000
Mean	$42,974
Median	$42,974
Mode	$42,974
Standard Deviation	$0
Variance	$0
Skewness	0.00
Kurtosis	+Infinity
Coefficient of Variability	0.00
Range Minimum	$42,974
Range Maximum	$42,974
Range Width	$0
Mean Standard Error	$0.00



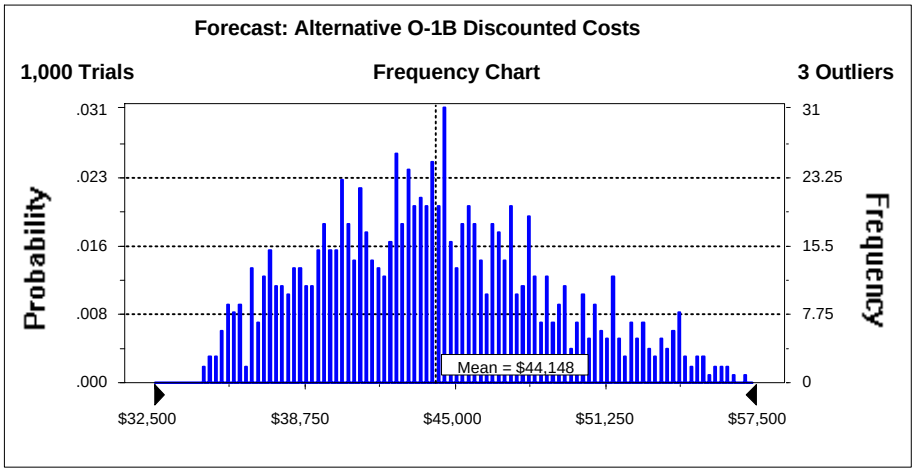
ONR Alternative 0-1B Cost Summary (K$)

(ONR CAS functions transfer to DCMC. 3 FTEs are retained by ONR and 73 ONR CAS FTEs become DCMC employees.)
(DCMC will eventually reduce CAS staff for economies of scale.)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$219**	$110	$110	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$1,219**	$610	$610	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$1,261**	$624	$638	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$1,156**	$588	$568	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2 Personnel Cost											
2.2a DCMC Personnel	**$47,489**	$6,664	$6,664	$5,998	$5,398	$4,858	$4,373	$3,935	$3,542	$3,188	$2,869
2.2b ONR CAS Personnel	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2c ONR Headquarters Personnel	**$2,551**	$255	$255	$255	$255	$255	$255	$255	$255	$255	$255
Total O&S Costs (Constant)	**$50,040**	$6,919	$6,919	$6,253	$5,653	$5,113	$4,628	$4,190	$3,797	$3,443	$3,124
Total O&S Costs (Inflated)	**$55,853**	$7,079	$7,241	$6,695	$6,192	$5,729	$5,304	$4,913	$4,554	$4,224	$3,922
Total O&S Costs (Discounted)	**$42,515**	$6,679	$6,447	$5,624	$4,907	$4,285	$3,743	$3,271	$2,861	$2,504	$2,193
Total Investment and O&S Costs (Constant)	**$51,259**	$7,529	$7,529	$6,253	$5,653	$5,113	$4,628	$4,190	$3,797	$3,443	$3,124
Total Investment and O&S Costs (Inflated)	**$57,115**	$7,702	$7,879	$6,695	$6,192	$5,729	$5,304	$4,913	$4,554	$4,224	$3,922
Total Investment and O&S Costs (Discounted)	**$43,671**	$7,267	$7,015	$5,624	$4,907	$4,285	$3,743	$3,271	$2,861	$2,504	$2,193

ONR Alternative O-1A Risk Summary

Statistics:	**Value**
Trials	1,000
Mean	$44,148
Median	$42,861
Mode	---
Standard Deviation	$4,901
Variance	$24,021,097
Skewness	0.35
Kurtosis	2.59
Coefficient of Variability	0.11
Range Minimum	$34,684
Range Maximum	$58,005
Range Width	$23,321
Mean Standard Error	$154.99



1 Basis of Estimate, ONR

1.1 ONR Status Quo

1.1.1 Definition:

Alternative O-SQ is defined as leaving the CAS function as the responsibility of ONR. ONR would continue to operate in the same fashion, administering grants and contracts for the DoD, as well as other Federal Agencies.

1.1.2 Element 1.1 – Training

There are no investment costs for the status quo alternative. The ONR offices, including headquarters and the regional offices operate as they are currently operating, so there are no investment training costs.

1.1.3 Element 1.2 – System Interface Costs

There are no investment costs for the status quo alternative. The existing Contract Administration Management Information System (CAMIS) is currently being upgraded and is 80% complete. This cost is already reflected in the actual direct overhead that is applied to the burdened labor rates in element 2.2b.

1.1.4 Element 2.1 – Recurring Training

Recurring training costs are included in the burdened labor rates in element 2.2b.

1.1.5 Element 2.2a – DCMC Personnel

There are no costs for this element under the status quo alternative since ONR offices will staff their CAS with ONR personnel. Therefore, there are no additional DCMC costs.

1.1.6 Element 2.2b – ONR Personnel

This element captures all ONR personnel at the Headquarters Office, Regional Offices, and SRB. Based on interviews with the Headquarters Office in Arlington Virginia, of the total current ONR personnel (81), 78 FTEs are 100% dedicated to CAS. The other 3 ONR personnel are involved in Program Management and other supervisory functions.

Costs were estimated by determining the number of FTEs that are paid out of the ONR budget, which includes the number of reimbursable billets from NASA (23). This final number of FTEs was then multiplied by the average ONR personnel salary ($51K) and the ONR "burden rate" (1.68). We multiplied the total number of FTEs for each year by a "burden rate" to capture other non-personnel costs such as rent, utility, supplies, systems and training. This cost estimate was applied for years 2000 through 2009.

The original number of FTEs accounted for year 1999 was 81; however, for year 2000, that number will be reduced to 76. For year 2001, and all subsequent years throughout the life cycle, there will be a 3.5% annual rate of reduction in FTEs. This 3.5% was based on discussions with ONR regarding historical and projected rates of reduction. The following table provides a schedule of FTEs phased out by year 2009.

ONR Offices	ONR Employees in 2000	ONR Employees in 2009
Virginia, Headquarters	7	5
Albuquerque, NM	0	0
Atlanta, GA	14	10
Austin, TX	0	0
Boston, MA	16	12
Chicago, IL	15	11
San Diego, CA	14	10
Seattle, WA	10	7
Total FTEs:	**76**	**55**

1.2 ONR Alternative 0-1B

1.2.1 Definition:

Alternative O-1A is defined as transitioning the CAS function from ONR to DCMC. As baselined by ONR, starting in year 2000, 73 ONR CAS personnel would become DCMC employees and physically relocate to a nearby CAO while 3 FTEs would be retained by ONR Headquarters.

1.2.2 Element 1.1 – Training

There are minimal training investment costs for Alternative O-1B. When the cadre of 73 ONR personnel become DCMC employees, they are already trained to perform CAS functions. However, when these ONR personnel become DCMC personnel, they may be required to participate in training related to DCMC policies and procedures. We assumed that 73 FTEs would engage in one-time DCMC training of $3K. Total training cost of ~ $219K was allocated across two years ($109 K per year). For risk purposes, we used a low end cost of $1.5K per FTE and a high of $4.5K per FTE for this training cost element.

1.2.3 Element 1.2 – System Interface Costs

There are some system interface costs that need to be captured in this alternative. With the transfer of people and functions to DCMC , the DCMC Contract Administration system, MOCAS, would need to interface with data from ONR's system, CAMIS. This would require the development of an interface between the two systems and perhaps the purchase of hardware and software. Based on the historical interface costs associated with the systems and interviews with Systems Engineers at ONR and DCMC, we have assigned a cost of $1M to this. For risk analysis, we varied this cost between $500K and $1.5M.

1.2.4 Element 2.1 – Recurring Training

This captures the annual employee training at DCMC; it is included in the DCMC burden.

1.2.5 Element 2.2a – DCMC Personnel

ONR CAS personnel are transferred into DCMC. For years 2000 and 2001, no change will occur for the number of newly transferred CAS DCMC FTEs (73). However, for years 2002 and following, we included an annual 10% reduction of DCMC staff, as shown in the following schedule. This 10% figure is based on the predicted natural downsizing of DCMC plus the predicted efficiencies expected from the transfer of functions to DCMC. For risk analysis purposes, we assumed that 20% is the highest reduction rate and the lowest reduction rate is 0%.

Year	ONR Transferred CAS FTEs
2000	73
2001	73
2002	66
2003	59
2004	53
2005	48
2006	43
2007	39
2008	35
2009	31

The cost for this element is comprised of the number of ONR FTEs transferred to the CAOs multiplied by the average ONR CAS salary ($51K) multiplied by the DCMC burden rate (1.8). We applied the DCMC burden rate because former ONR personnel are now DCMC employees. We maintained the ONR salary figure since the ONR employees would maintain their current salaries when transferred. The DCMC burden rate captures nonpersonnel costs such as rent, utility, supplies, systems, and training. This cost estimate was then applied through years 2000 through 2009.

1.2.6 Element 2.2b – ONR CAS Personnel

There is no cost for this element under this alternative since ONR CAS personnel become DCMC employees. The cost are now captured in element 2.2a.

1.2.7 Element 2.2c – ONR Headquarters Personnel

This cost element captures a total of 3 FTEs required to various non-CAS functions, such as program management, policy, university relations and headquarters operational functions.

The cost for this element is comprised of the number of ONR Headquarters FTEs multiplied by the average ONR salary ($51K) multiplied by the ONR burden rate (1.68). This cost estimate was then applied through years 2000 through 2009.

APPENDIX G
DETAILED AAP INFORMATION

APPENDIX G-- DETAILED AAP INFORMATION

Table G-1a, Active GOCO AAPs

ACTIVE PLANTS	LOCATION	PRODUCTS	CONTRACTOR
Hawthorne Army Depot	Hawthorne, NV	• Receive, issue, store, renovate, test, demilitarize, & provide Quality Assurance Specialist (Ammunition Surveillance) (QASAS)/depot storage for conventional ammunition • Operate calibration lab & ballistics test facility • Maintain capability to receive/ship containerized cargo • Perform special missions & assignments as required	Day & Zimmerman/ Hawthorne Corporation
Holston AAP	Kingsport, TN	• Manufacture explosive and chemical materials • Handle and store strategic and critical materials for other Government agencies	Royal Ordnance of North America
Iowa AAP	Middletown, IA	• Load, assemble, and pack (LAP) ammunition items • Perform special mission assignments • Maintain capability to receive/ship containerized cargo • Perform QASAS/storage surveillance functions	American Ordnance LLC
Lake City AAP	Independence, MO	• Manufacture small arms ammunition and associated explosive/pyrotechnic materials • Proof test small arms ammunition • Perform certification inspection of small arms ammunition inspection equipment in support of small caliber ammunition procurement and production mission • Provide special test and measurement services to monitor activities of the contractor's calibration system for the quality assurance function. • Coordinate, support, and assist in the development, installation, and test and evaluation of prototype production equipment in support of small caliber ammunition programs • Maintain the capability to receive/ship containerized cargo • Perform QASAS/storage surveillance functions, to include support of Sunflower AAP	Olin Corporation

ACTIVE PLANTS	LOCATION	PRODUCTS	CONTRACTOR
Lone Star AAP	Texarkana, TX	• Load, assemble, and pack ammunition items • Maintain the capability to receive/ship containerized cargo • Perform QASAS/storage surveillance functions	Day & Zimmermann, Inc.
Milan AAP	Milan, TN	• Load, assemble, and pack ammunition items • Maintain the capability to receive/ship containerized cargo • Handle and store ammunition as directed • Provide QASAS/storage surveillance functions	American Ordnance LLC
Radford AAP	Radford, VA	• Manufacture propellants, explosives, and chemical materials • Provide QASAS/storage surveillance	Alliant Techsystems, Inc.

Table G-1b, Inactive GOCO AAPs

INACTIVE PLANTS	LOCATION	STATUS	CONTRACTOR
Alabama	Childersburg, AL	Excess facilities	None
Badger	Baraboo, WI	Excess facilities under environmental remediation	Olin Corporation
Cornhusker	Grand Island, NE	Excess facilities under environmental remediation	ICI Americas, Inc.
Indiana	Charlestown, IN	Excess facilities under environmental remediation	ICI Americas, Inc.
Joliet	Joliet, IL	Excess facilities under environmental remediation	None
Kansas	Parsons, KS	Inactive-standby facilities	Day & Zimmermann, Inc.
Longhorn/ Louisiana	Doyline, LA	Longhorn is excess and administratively combined with Louisiana AAP which is an Army Reserve Plant	Valentec Systems, Inc.
Mississippi	Stennis Space Center, MI	Army Reserve Plant	Mason Technologies, Inc.
Ravenna	Ravenna, OH	Inactive-standby facilities	Mason and Hanger, Silas Mason, Co., Inc.
Riverbank	Riverbank, CA	Army Reserve Plant	NI Industries, Inc
Scranton	Scranton, PA	Army Reserve Plant	Chamberlain Manufacturing Corporation
Sunflower	De Soto, KS	Excess facilities under environmental remediation	Alliant Techsystems, Inc.
Twin Cities	New Brighton, MN	Inactive-standby facilities	Alliant Techsystems, Inc.
Volunteer	Chattanooga, TN	Excess facilities	ICI Americas, Inc.

Table G-2, Army Reserve and Inactive Standby Plants' Mission and Activity

PLANT	STATUS	MISSION	CURRENT ACTIVITY
Longhorn and Louisiana	Army Reserve	Manufacture large caliber metal parts	Maintain critical, essential metal parts manufacturing capability
Mississippi	Army Reserve	Manufacture grenade metal parts and load, assemble, and pack 155mm projectile	Facility contractor marketing alternative commercial and Government reutilization of assets while maintaining readiness
Riverbank	Army Reserve	Produce cartridge cases and grenade metal parts	Facility use contract allows production of competitively obtained commercial and defense metal parts orders
Scranton	Army Reserve	Manufacture ammunition metal parts	Facility use contract allows production of competitively obtained commercial and defense metal parts orders
Kansas	Inactive Standby	Third party and facility use contract for load, assemble, and pack efforts	Current production under third party contracts and facility use contract manufacturing
Ravenna	Inactive Standby	Excess for production	Storage of industrial stocks. Ongoing environmental remediation.
Twin Cities	Inactive Standby	Excess for production	Ongoing environmental remediation. Part of facility is used by present contractor for competitively obtained defense contracts
Badger	Excess site	None	Available for ARMS[13]
Cornhusker	Excess site	None	Available for ARMS
Indiana	Excess site	None	Available for ARMS
Joliet	Excess site	None	Available for ARMS
Sunflower	Excess site	None	Available for ARMS
Volunteer	Excess site	None	Available for ARMS

[13] The Armament Retooling and Manufacturing Support (ARMS) act passed by Congress in 1992 allows businesses to use "idle" capacity and capability at AAPs including land, buildings, equipment, utilities, communications and transportation.

Appendix H: AAP Detailed Cost Estimate and Basis of Cost Estimate

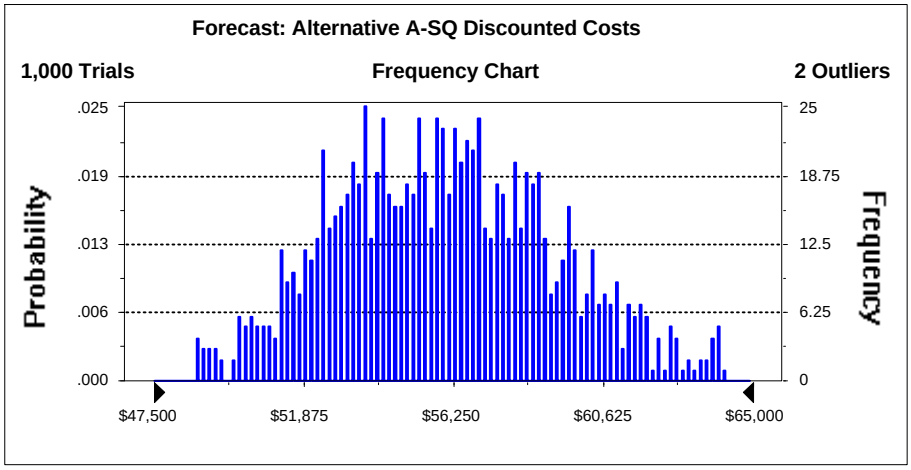
AAP Status Quo Cost Summary

(AAP retain CAS functions)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008
1.0 Investment Cost										
1.1 Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost										
2.1 Recurring Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2a DCMC Personnel (Addt'l for Actives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2b DCMC Personnel (Addt'l for Inactives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2c AAP CAS Personnel (Actives)	**$62,136**	$6,214	$6,214	$6,214	$6,214	$6,214	$6,214	$6,214	$6,214	$6,214
2.2d AAP CAS Personnel (Inactives)	**$3,449**	$375	$375	$375	$375	$375	$375	$375	$274	$274
Total O&S Costs (Constant)	**$65,585**	$6,589	$6,589	$6,589	$6,589	$6,589	$6,589	$6,589	$6,488	$6,488
Total O&S Costs (Inflated)	**$74,453**	$6,740	$6,895	$7,054	$7,216	$7,382	$7,552	$7,726	$7,782	$7,961
Total O&S Costs (Discounted)	**$54,301**	$6,360	$6,139	$5,926	$5,720	$5,521	$5,329	$5,144	$4,889	$4,719
Total Investment and O&S Costs (Constant)	**$65,585**	$6,589	$6,589	$6,589	$6,589	$6,589	$6,589	$6,589	$6,488	$6,488
Total Investment and O&S Costs (Inflated)	**$74,453**	$6,740	$6,895	$7,054	$7,216	$7,382	$7,552	$7,726	$7,782	$7,961
Total Investment and O&S Costs (Discounted)	**$54,301**	$6,360	$6,139	$5,926	$5,720	$5,521	$5,329	$5,144	$4,889	$4,719

AAP Status Quo Risk Summary

Statistics:	Value
Trials	1,000
Mean	$56,038
Median	$55,920
Mode	---
Standard Deviation	$3,223
Variance	$10,385,314
Skewness	0.21
Kurtosis	2.60
Coefficient of Variability	0.06
Range Minimum	$48,727
Range Maximum	$65,369
Range Width	$16,642
Mean Standard Error	$101.91



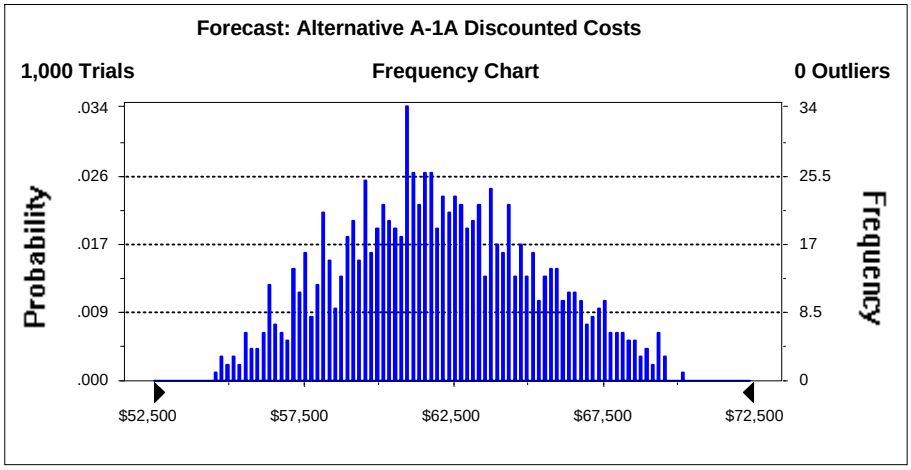
AAP Alternative A-1A Cost Summary

(AAP CAS functions transfer to DCMC, but personnel physically located at AAP facilities)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$267**	$134	$134	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$1,267**	$634	$634	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$1,311**	$648	$663	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$1,202**	$611	$590	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2a DCMC Personnel (Addt'l for Actives)	**$67,470**	$6,747	$6,747	$6,747	$6,747	$6,747	$6,747	$6,747	$6,747	$6,747	$6,747
2.2b DCMC Personnel (Addt'l for Inactives)	**$5,266**	$576	$576	$576	$576	$576	$576	$576	$411	$411	$411
2.2c AAP CAS Personnel (Actives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2d AAP CAS Personnel (Inactives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total O&S Costs (Constant)	**$72,736**	$7,323	$7,323	$7,323	$7,323	$7,323	$7,323	$7,323	$7,158	$7,158	$7,158
Total O&S Costs (Inflated)	**$82,556**	$7,491	$7,664	$7,840	$8,020	$8,205	$8,393	$8,586	$8,587	$8,784	$8,986
Total O&S Costs (Discounted)	**$60,237**	$7,068	$6,823	$6,586	$6,357	$6,136	$5,923	$5,717	$5,394	$5,207	$5,026
Total Investment and O&S Costs (Constant)	**$74,003**	$7,956	$7,956	$7,323	$7,323	$7,323	$7,323	$7,323	$7,158	$7,158	$7,158
Total Investment and O&S Costs (Inflated)	**$83,867**	$8,139	$8,327	$7,840	$8,020	$8,205	$8,393	$8,586	$8,587	$8,784	$8,986
Total Investment and O&S Costs (Discounted)	**$61,439**	$7,680	$7,413	$6,586	$6,357	$6,136	$5,923	$5,717	$5,394	$5,207	$5,026

AAP Alternative A-1A Risk Summary

Statistics:	Value
Trials	1,000
Mean	$62,029
Median	$61,873
Mode	---
Standard Deviation	$3,265
Variance	$10,658,599
Skewness	0.12
Kurtosis	2.41
Coefficient of Variability	0.05
Range Minimum	$56,616
Range Maximum	$70,188
Range Width	$15,572
Mean Standard Error	$103.24



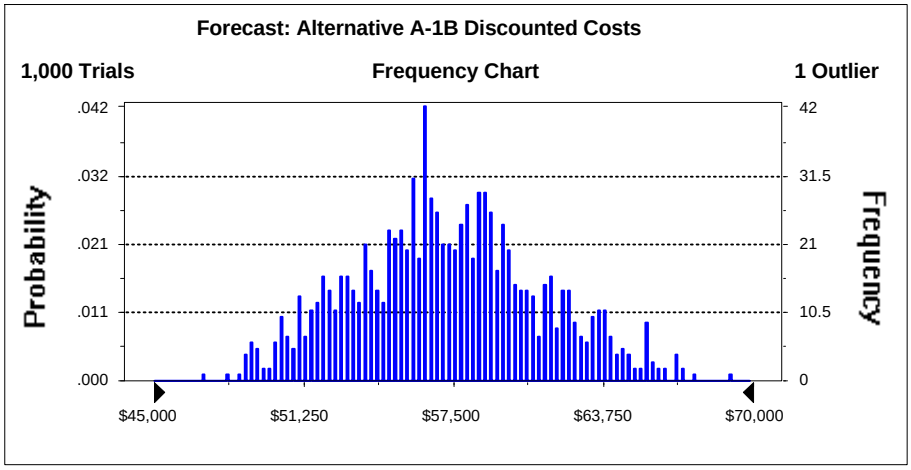
AAP Alternative A-1B Cost Summary

(AAP CAS functions transfer to DCMC, and personnel physically relocate to a CAO)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$277**	$138	$138	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$1,277**	$638	$638	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$1,321**	$653	$668	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$1,211**	$616	$595	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$178**	$0	$0	$6	$12	$17	$21	$25	$29	$32	$35
2.2a DCMC Personnel (Addt'l for Actives)	**$60,384**	$6,914	$6,914	$6,609	$6,335	$6,088	$5,866	$5,666	$5,486	$5,325	$5,179
2.2b DCMC Personnel (Addt'l for Inactives)	**$5,785**	$679	$679	$644	$613	$584	$559	$536	$515	$496	$480
2.2c AAP CAS Personnel (Actives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.2d AAP CAS Personnel (Inactives)	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total O&S Costs (Constant)	**$66,168**	$7,593	$7,593	$7,253	$6,948	$6,673	$6,425	$6,202	$6,002	$5,821	$5,659
Total O&S Costs (Inflated)	**$74,647**	$7,768	$7,946	$7,766	$7,609	$7,476	$7,364	$7,272	$7,199	$7,143	$7,103
Total O&S Costs (Discounted)	**$55,318**	$7,329	$7,075	$6,523	$6,031	$5,591	$5,197	$4,842	$4,523	$4,234	$3,973
Total Investment and O&S Costs (Constant)	**$67,445**	$8,232	$8,232	$7,253	$6,948	$6,673	$6,425	$6,202	$6,002	$5,821	$5,659
Total Investment and O&S Costs (Inflated)	**$75,968**	$8,421	$8,615	$7,766	$7,609	$7,476	$7,364	$7,272	$7,199	$7,143	$7,103
Total Investment and O&S Costs (Discounted)	**$56,529**	$7,946	$7,669	$6,523	$6,031	$5,591	$5,197	$4,842	$4,523	$4,234	$3,973

Alternative A-1B Risk Summary

Statistics:	Value
Trials	1,000
Mean	$57,300
Median	$57,103
Mode	---
Standard Deviation	$3,930
Variance	$15,445,846
Skewness	0.16
Kurtosis	2.69
Coefficient of Variability	0.07
Range Minimum	$47,007
Range Maximum	$70,100
Range Width	$23,094
Mean Standard Error	$124.28



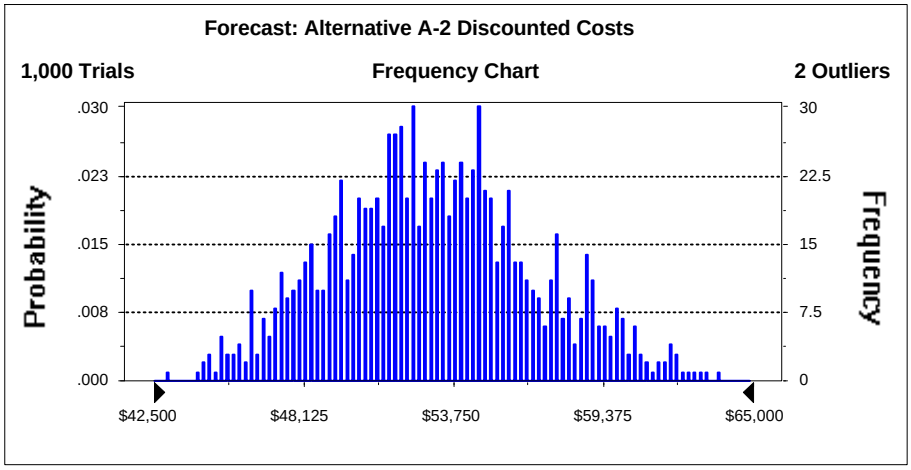
AAP Alternative A-2 Cost Summary

(Some AAP CAS functions transfer to DCMC, some stay with AAP; DCMC employees relocate to a CAO, AAP employees stay at AAP facilities)

	Total	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.0 Investment Cost											
1.1 Training	**$124**	$62	$62	$0	$0	$0	$0	$0	$0	$0	$0
1.2 System Interface Design	**$1,000**	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Constant)	**$1,124**	$562	$562	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Inflated)	**$1,163**	$575	$588	$0	$0	$0	$0	$0	$0	$0	$0
Total Investment Costs (Discounted)	**$1,066**	$542	$524	$0	$0	$0	$0	$0	$0	$0	$0
2.0 O&S Cost											
2.1 Recurring Training	**$178**	$0	$0	$6	$12	$17	$21	$25	$29	$32	$35
2.2a DCMC Personnel (Addt'l for Actives)	**$21,712**	$3,047	$3,047	$2,742	$2,468	$2,221	$1,999	$1,799	$1,619	$1,457	$1,312
2.2b DCMC Personnel (Addt'l for Inactives)	**$2,494**	$350	$350	$315	$283	$255	$230	$207	$186	$167	$151
2.2c AAP CAS Personnel (Actives)	**$34,328**	$3,433	$3,433	$3,433	$3,433	$3,433	$3,433	$3,433	$3,433	$3,433	$3,433
2.2d AAP CAS Personnel (Inactives)	**$1,902**	$210	$210	$210	$210	$210	$210	$210	$145	$145	$145
Total O&S Costs (Constant)	**$60,435**	$7,039	$7,039	$6,700	$6,394	$6,119	$5,871	$5,648	$5,383	$5,202	$5,040
Total O&S Costs (Inflated)	**$68,118**	$7,201	$7,367	$7,173	$7,003	$6,856	$6,729	$6,623	$6,457	$6,384	$6,326
Total O&S Costs (Discounted)	**$50,593**	$6,795	$6,559	$6,025	$5,550	$5,127	$4,749	$4,410	$4,056	$3,784	$3,538
Total Investment and O&S Costs (Constant)	**$61,559**	$7,601	$7,601	$6,700	$6,394	$6,119	$5,871	$5,648	$5,383	$5,202	$5,040
Total Investment and O&S Costs (Inflated)	**$69,281**	$7,776	$7,955	$7,173	$7,003	$6,856	$6,729	$6,623	$6,457	$6,384	$6,326
Total Investment and O&S Costs (Discounted)	**$51,659**	$7,337	$7,082	$6,025	$5,550	$5,127	$4,749	$4,410	$4,056	$3,784	$3,538

Alternative A-2 Risk Summary

Statistics:	Value
Trials	1,000
Mean	$53,050
Median	$52,880
Mode	---
Standard Deviation	$3,834
Variance	$14,696,056
Skewness	0.22
Kurtosis	2.81
Coefficient of Variability	0.07
Range Minimum	$43,010
Range Maximum	$65,965
Range Width	$22,956
Mean Standard Error	$121.23



1 Basis of Estimate, AAP

1.1 AAP Status Quo

1.1.1 Definition:

Alternative A-SQ is defined as leaving the CAS function as the responsibility of AAP. With the Army Industrial Operations Command (IOC) in charge of CAS, AAP would continue to operate in the same fashion.

1.1.2 Element 1.1 – Training

There are no investment costs for the status quo alternative. Each active and inactive ammo plant operates as it is currently operating so there is no investment training. Recurring training is captured in element 2.1.

1.1.3 Element 1.2 – System Interface Costs

There are no investment costs for the status quo alternative. Each active and inactive ammo plant operates as it is currently operating so there are no system interface costs. The existing CAS information systems do not need to be upgraded since they will remain as-is in the Status Quo.

1.1.4 Element 2.1 – Recurring Training

Recurring training costs are included in the burdened labor rates in elements 2.2a – 2.2d.

1.1.5 Element 2.2a – DCMC Personnel (Additional for Actives)

There are no costs for this element under the status quo alternative since the active ammo plants will staff their CAS with AAP FTEs. There are no additional DCMC costs.

1.1.6 Element 2.2b – DCMC Personnel (Additional for Inactive)

There are no costs for this element under the status quo alternative since the inactive ammo plants will staff their CAS with AAP FTEs. There are no additional DCMC costs.

1.1.7 Element 2.2c – AAP CAS Personnel (Actives)

This element captures the AAP CAS FTEs at the active ammo plants. Based on interviews with the IOC, the Lake City facility, and data collected by the IOC from the seven (Lone Star, Radford, Holsten, Milan, Iowa, Lake City, and Hawthorne) active plants, we identified the CAS personnel at each plant. To be considered "CAS," the personnel had to spend greater than 50% of their time in any of four CAS functions: contract administration, equipment management, traffic management, or quality. We opted to use this methodology since each active and inactive plant may only have one or two CAS FTEs at their respective locations. If any billet had greater than 50% CAS responsibility, we counted the billet as a CAS FTE. Each facility was investigated on a case-by-case basis. Using this methodology, we identified the following CAS FTEs at each facility.

Active Plant	Status Quo: CAS AAP FTEs at AAP
Lone Star	8.0
Radford	15.8
Holston	9.0
Milan	13.7
Iowa	16.0
Lake City	14.0
Hawthorne	5.0
Total	**81.4***

Status Quo: Total CAS FTEs – Active Plants

This total number of FTEs (81.4) was then multiplied by the average active/inactive plant salary ($46K) and the active/inactive plant "burden factor" (1.67). The "burden factor" is used to capture other non-personnel costs such as rent, utility, supplies, and training. This cost estimate was then applied from years 2000 through 2009 for an annual cost of $6.2M. For risk analysis, we varied the plant salary between $40K and $52K and the burden factor between 1.65 and 1.8 to address a degree of uncertainty.

1.1.8 Element 2.2d – AAP CAS Personnel (Inactive)

This element captures the AAP CAS FTEs at the inactive ammo plants. Based on interviews with the IOC, the Sunflower facility, and data collected by the IOC from five (Kansas, Longhorn/Louisiana, Mississippi, Riverbank, and Scranton) inactive plants, we identified the CAS FTEs at each plant. We only considered these five plants from the list of inactive plants because the IOC plans to engage in long-term relationships with them. The other inactive plants were either going through environmental remediation only or were already closed. To be considered "CAS," the personnel had to spend greater than 50% of their time in any of five CAS functions: contract administration, equipment management, facility management, production oversight, or traffic management. We opted to use this methodology since each active and inactive plant may only have one or two CAS FTEs at their respective locations. Each facility was investigated on a case-by-case basis. Using this methodology, we identified the following CAS FTEs at each facility.

* indicates numbers have been rounded

Inactive Plant	Status Quo: CAS AAP FTEs at AAP
Kansas	1.3
Longhorn/ Louisiana	1.2
Mississippi	0.0
Riverbank	0.0
Scranton	2.4
	Total SQ FTEs: 4.9

Status Quo: Total CAS FTEs – Inactive Plants

This total number of FTEs (4.9) was then multiplied by the average active/inactive plant salary ($46K) and the active/inactive plant "burden factor" (1.67). We multiplied by a "burden factor" to capture other non-personnel costs such as rent, utility, supplies, and training. This cost estimate was then applied from years 2000 through 2006 for an annual cost of $375K. From 2007 through 2009, we removed the Kansas facility CAS FTEs since, according to the IOC, that facility will be closed by then. For risk analysis, we varied the plant salary between $40K and $52K and the burden factor between 1.65 and 1.8 to address a degree of uncertainty.

1.2 AAP Alternative A-1A

1.2.1 Definition/Rationale:

Alternative A-1A is defined as AAP CAS FTEs becoming DCMC FTEs and physically remaining at the AAP. Under this alternative, the current CAS personnel (81.4 at active, 4.9 at inactive) "switch hats" and stay at their current location. The following charts show the number of FTEs and their locations at both the active plants and the inactive plants. The number of FTEs increases slightly under this alternative to account for rounding. If the CAS functions are moved to DCMC and the personnel remain at the plants, we would need to round the FTEs up to whole bodies. The active plant total becomes 82 personnel and the inactive total becomes 7 personnel.

Active Plant	Alt A-1A New DCMC FTEs at AAP
Lone Star	8.0
Radford	16.0
Holston	9.0
Milan	14.0
Iowa	16.0
Lake City	14.0
Hawthorne	5.0
Total Alt A-1A	**FTEs: 82.0**

Alt A-1A: Distribution of Total CAS FTEs – Active Plants

Inactive Plant	Alt A1A New DCMC FTEs at AAP
Kansas	2.0
Longhorn/ Louisiana	2.0
Mississippi	0.0
Riverbank	0.0
Scranton	3.0
Total Alt A-1A	**FTEs: 7.0**

Alt A-1A: Distribution of Total CAS FTEs – Inactive Plants

1.2.2 Element 1.1 – Training

There are minimal training investment costs for Alternative A-1A. When the cadre of existing AAP personnel "switch hats" and become DCMC employees, they are already trained to do CAS functions. However, when these AAP personnel become DCMC personnel, they may be required to participate in some DCMC training. We assumed that the 89 (82+7) FTEs would engage in one-time DCMC training of $3K. Total training cost of ~ $267K was allocated across two fiscal years ($134K per year).

1.2.3 Element 1.2 – System Interface Costs

There are some system interface costs that need to be captured in this alternative. Even though the new transitioned DCMC personnel do not physically relocate, to take advantage of DCMC information system synergy, the AAP CAS information systems and the DCMC CAS information systems would have to communicate. Thus, this alternative must include costs for this interface. Since the requirements for this interface are undefined, so are the costs. Based on conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.2.4 Element 2.1 – Recurring Training

Since, existing AAP personnel transition to DCMC positions, there are no costs associated with this cost element. As such recurring training costs are buried in the burdened labor rates in elements 2.2a – 2.2b.

1.2.5 Element 2.2a – DCMC Personnel (Additional for Actives)

Under this alternative, the active AAP CAS FTEs become DCMC FTEs so this cost element is calculated by taking the number of DCMC CAS FTEs under this alternative (82), multiplying it by the average AAP CAS salary ($46K), and multiplying that by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) Because of the higher DCMC burden factor and the additional FTE, costs under 2.2a in this alternative are slightly higher than costs under 2.2c in the status quo. This cost estimate was then applied from years 2000 through 2009. For risk analysis, we varied the plant salary between $40K and $52K to address a degree of uncertainty.

1.2.6 Element 2.2b – DCMC Personnel (Additional for Inactives)

Under this alternative, the inactive AAP CAS FTEs become DCMC FTEs. This cost element is calculated by taking the number of DCMC CAS FTEs in this alternative (7), multiplying by the average AAP CAS salary ($46K), and then multiplying by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) This cost estimate was then applied from years 2000 through 2006. From 2007 through 2009, we removed the Kansas facility CAS FTEs since, according to the IOC, the plant will be closed by then. For risk analysis, we varied the plant salary between $40K and $52K to address a degree of uncertainty.

1.2.7 Element 2.2c – AAP CAS Personnel (Actives)

There are no costs under this element for this alternative since the active CAS personnel have all switched hats and become DCMC employees. The costs are now captured in element 2.2a.

1.2.8 Element 2.2d – AAP CAS Personnel (Inactives)

There are no costs under this element for this alternative since the inactive CAS personnel have all switched hats and become DCMC employees. The costs are now captured in element 2.2b.

1.3 AAP Alternative A-1B

1.3.1 Definition/Rationale:

Alternative A-1B is defined as moving the CAS function out of AAP and into DCMC. The AAP CAS personnel would become DCMC employees and those positions that can be will be physically relocated to a DCMC Contract Administrative Office (CAO). Under this alternative, the current CAS FTEs (81.4 at active, 4.9 at inactive) “switch hats”.

We first isolated the CAS FTEs into two categories: DCMC personnel that would relocate and personnel that would not. Most of these people (except for two) were completely assigned (100%) to a unique CAS function. As such, they were easily separated into people that could relocate to a CAO and those who had to remain at the ammo plant. According to the IOC and the active plants, the equipment management function and the quality assurance (QA) function must stay at the plant. We made an assumption that one person at Radford and one person at Milan could transfer their non-CAS functions (435 and 540 hours respectively) to other AAP personnel located at these respective plants.

As shown by the chart below, 47 new DCMC FTEs had to stay at the ammo plants. However, 37 FTEs could physically relocate to a CAO. Like Alternative A-1A, the DCMC staff that stay at the ammo plants needed to be rounded up to whole numbers. However, the DCMC staff that relocate to the CAOs do not have to be rounded because they are co-located and sharing of duties is feasible.

Of the CAS personnel relocated to a CAO, we assumed DCMC would eventually draw down the AAP unique CAS staffing consistent with past operations. Based on discussions with DCMC, a 10% annual reduction in CAS FTEs may be possible. For risk analysis purposes, we

assumed that 20% is the highest reduction rate and the lowest reduction rate is 0%. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (37). However, after 2001, we calculated an annual 10% reduction of new CAS DCMC FTEs.

The rationale behind this assumption is to capture economies of scale associated with the consolidation with DCMC. See the qualitative section for expected impacts on quality.

Active Plant	Alt A1B New DCMC FTEs at AAP	Alt A1B: New DCMC FTEs at CAO
Lone Star	4.0	4.0
Radford	10.0	6.0
Holston	3.0	6.5
Milan	10.0	4.6
Iowa	9.0	7.0
Lake City	11.0	4.0
Hawthorne	0.0	5.0
Total	47.0	37.0*
	Total Alt A1B	**FTES: 84.0**

Alt A-1B: Distribution of CAS FTEs – Active Plants

Like the active plants, the inactive AAP CAS personnel become DCMC personnel and those positions that can physically relocate, to a CAO. We first isolated the CAS personnel into two categories: DCMC personnel that would relocate and personnel that would not. We reviewed each plant on a case-by-case basis and determined that slightly more than 50% (4.3 FTEs) could relocate to a CAO. The others would have to remain at the ammo plant. According to the IOC and the inactive plants, only the equipment management function must stay at the plant.

As shown by the chart below, 4 new DCMC FTEs had to stay at the ammo plants. However, 4.3 FTEs could physically relocate to a CAO. Like Alternative A-1A, the DCMC staff that stay at the ammo plants need to be rounded up to whole numbers. However, the DCMC staff that relocate to the CAOs do not have to be rounded because co-location at a CAO allows for sharing of duties with existing DCMC staff.

Like the active plants, a 10% annual reduction in CAS FTEs may be possible. For risk analysis purposes, we assumed that 20% is the highest reduction rate and the lowest reduction rate is 0%. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (4.3). However, after 2001, we calculated an annual 10% reduction of new CAS DCMC FTEs.

* indicates number has been rounded

Inactive Plant	Alt A1B New DCMC FTEs at AAP	Alt A1B: New DCMC FTEs at CAO
Kansas	1.0	1.1
Longhorn/ Louisiana	2.0	0.9
Mississippi	0.0	0.0
Riverbank	0.0	0.0
Scranton	1.0	2.2
Total	4.0	4.3*
	Total Alt A1B	**FTEs: 8.3**

Alt A- 1B: Distribution of CAS FTEs – Inactive Plants

1.3.2 Element 1.1 – Training

There are minimal training investment costs for Alternative A-1B. When the cadre of existing AAP personnel "switch hats" and become DCMC employees, they are already trained to do CAS functions. However, when these AAP personnel become DCMC personnel, they may be required to participate in some DCMC training. We assumed that the 92.3 (84+8.3) FTEs would engage in one-time DCMC training of $3K ~ $277K was allocated across two fiscal years ($134K per year).

1.3.3 Element 1.2 – System Interface Costs

There are some system interface costs that need to be captured in this alternative. Even though the new DCMC personnel do not physically relocate, to take advantage of DCMC information system synergy, the AAP CAS information systems and the DCMC CAS information systems would have to communicate. Thus, this alternative must include costs for this interface. Since the requirements for this interface are undefined, so are the costs. Based on the conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.3.4 Element 2.1 – Recurring Training

For years 2000 and 2001, existing personnel assume the DCMC positions so recurring training costs are buried in the burdened labor rates in element 2.2a – 2.2b. But, from 2002 through 2009, FTEs are moved from the ammo plants to a CAO. As AAP FTEs are absorbed into DCMC, those transferred FTEs as well as new DCMC staff will require training in ammunition specific topics. As such recurring training costs increase for DCMC in the outyears to maintain ammunition/explosives expertise. This calculation is a function of a small number of DCMC FTEs being required to take one additional class per year.

* indicates number has been rounded

1.3.5 Element 2.2a – DCMC Personnel (Additional for Actives)

To calculate this cost element, we took the number of DCMC CAS FTEs identified in this alternative (84), multiplied it by the average AAP CAS salary ($46K), and multiplied it by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) This cost estimate is in years 2000 and 2001. However, from years 2002 through 2009, we decreased the number of DCMC FTEs at the CAO by 10% per year calculating a range of 0 – 20% for risk analysis purposes. The number of DCMC FTEs at the ammo plants (47) stays constant. For risk analysis, we varied the plant salary between $40K and $52K to address a degree of uncertainty.

1.3.6 Element 2.2b – DCMC Personnel (Additional for Inactives)

To calculate this cost element, we took the number of DCMC CAS FTEs identified in this alternative (8.3), multiplied it by the average AAP CAS salary ($46K), and multiplied it by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) This cost estimate is in years 2000 and 2001. However, from years 2002 through 2009, we decreased the number of DCMC FTEs at the CAO by 10% per year calculating a range of 0 – 20% for risk analysis purposes. The number of DCMC FTEs at the ammo plants (4) stays constant. For risk analysis, we varied the plant salary between $40K and $52K since this is unknown.

1.3.7 Element 2.2c – AAP CAS Personnel (Actives)

There are no costs under this element for this alternative since the active CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2a.

1.3.8 Element 2.2d – AAP CAS Personnel (Inactives)

There are no costs under this element for this alternative since the inactive CAS personnel have switched hats and become DCMC employees. The costs are now captured in element 2.2b.

1.4 Alternative A-2

1.4.1 Definition:

Alternative A-2 is defined as some functions being delegated to DCMC and other CAS functions remaining with the AAP. Under this alternative, the DCMC CAS FTEs (37 at active, 4.3 at inactive) “switch hats” and relocate to a DCMC CAO. Those that have to stay at the ammo plants remain Army employees.

Some of the active plant AAP CAS personnel become DCMC personnel and physically relocate, so we first isolated the CAS personnel into two categories: DCMC personnel that would relocate and personnel that would not. Most of these people (except for two) were completely assigned (100%) to a unique CAS function. As such, they were easily separated into people that could relocate to a CAO and those who had to remain at the ammo plant. According to the IOC and the active plants, the equipment management function and the quality assurance (QA) function must stay at the plant. We made an assumption that one person’s 435 non-CAS hours at Radford and one person’s 540 hours at Milan could be reallocated to AAP personnel located at these respective plants.

As shown by the chart below, 45 CAS FTEs remained Army employees and stayed at the ammo plants. However, 37 FTEs could physically relocate to a CAO.

If the CAS FTEs are relocated to a CAO, DCMC would eventually draw down the AAP unique CAS staffing consistent with past operations. Based on discussions with DCMC, a 10% annual reduction in CAS FTEs may be possible. For risk analysis purposes, we assumed that 20% is the highest reduction rate and the lowest reduction rate is 0%. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (37). However, after 2001, there will be an annual 10% reduction of new CAS DCMC FTEs. The rationale behind this assumption is to capture economies of scale and professional efficiencies associated with the CAS consolidation with DCMC. See the qualitative section for expected impacts on quality.

Active Plant	Alt A-2: AAP FTEs at AAP	Alt A-2: New DCMC FTEs at CAO
Lone Star	4.0	4.0
Radford	10.0	6.0
Holston	2.5	6.5
Milan	9.4	4.6
Iowa	9.0	7.0
Lake City	10.0	4.0
Hawthorne	0.0	5.0
Total	45*	37.0*
	Total Alt A-2	**FTEs: 82**

Alt A-2: Distribution of CAS FTEs – Active Plants

Like the active plants, some of the inactive plant AAP CAS personnel become DCMC personnel and physically relocate, so we first isolated the CAS personnel into two categories: DCMC personnel that would relocate and personnel that would not. We reviewed each plant on a case-by-case basis and determined that slightly less than 50% (4.3 FTEs) could relocate to a CAO. The other FTEs would stay with the Army. According to the IOC and the inactive plants, only the equipment management function must stay at the plant.

As shown by the chart below, 4 FTEs remain with the Army while 4.3 FTEs could physically relocate to a CAO. Like the Status Quo, the Army staff that stay at the ammo plants could easily continue to divide their time into CAS and non-CAS functions so they don't have to be rounded. Similarly, the DCMC staff that relocate to the CAOs do not have to be rounded because they are co-located and sharing of duties is feasible.

Like the active plants, a 10% annual reduction in CAS FTEs may be possible. For risk analysis purposes, we assumed that 20% is the highest reduction rate and the lowest reduction rate is 0%. For 2000-2001, no change will occur for the number of new CAS DCMC FTEs (4.3). However, after 2001,we calculated an annual 10% reduction of new CAS DCMC FTEs.

* indicates number has been rounded

Inactive Plant	Alt A-2: AAP FTEs at AAP	Alt A-2: New DCMC FTEs at CAO
Kansas	0.9	1.1
Longhorn/ Louisiana	1.1	0.9
Mississippi	0.0	0.0
Riverbank	0.0	0.0
Scranton	0.8	2.2
Total	2.8	4.3
	Total Alt A-2	**FTEs: 7.0**

Alternative A-2: Distribution CAS FTEs-- Inactive Plants

1.4.2 Element 1.1 – Training

There are minimal training investment costs for Alternative A-2. When the cadre of existing AAP personnel "switch hats" and become DCMC employees, they are already trained to do CAS functions. However, when these AAP personnel become DCMC personnel, they may be required to participate in some DCMC training. We assumed that the 41.3 (37+4.3) FTEs would engage in one-time DCMC training of $3K ~ $124K which we allocated across two fiscal years ($62K per year).

1.4.3 Element 1.2 – System Interface Costs

There are some system interface costs that need to be captured in this alternative. The AAP CAS information systems and the DCMC CAS information systems will have to communicate. Thus, this alternative must include costs for this interface. Since the requirements for this interface are undefined, so are the costs. Based on conversations with DCMC, we have assigned a cost of $1M to this. For risk analysis and to address a degree of uncertainty, we varied this cost between $500K and $1.5M.

1.4.4 Element 2.1 – Recurring Training

For years 2000 and 2001, existing personnel assume the DCMC positions so recurring training costs are buried in the burdened labor rates in element 2.2a – 2.2d. But, from 2002 through 2009, FTEs are moved from the ammo plants to a CAO. As AAP FTEs are absorbed into DCMC, those transferred FTEs as well as new DCMC staff will require training in ammunition specific topics. As such recurring training costs increase for DCMC in the outyears to maintain ammunition/explosives expertise. This calculation is a function of a small number of DCMC FTEs being required to take one additional class per year.

1.4.5 Element 2.2a – DCMC Personnel (Additional for Actives)

To calculate this cost element, we took the number of DCMC CAS FTEs as identified in this alternative (37), multiplied by the average AAP CAS salary ($46K), and multiplied by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) This cost estimate is in years 2000 and 2001. However, from years 2002 through 2009,

we decreased the number of DCMC FTEs at the CAO by 10% per year calculating a range of 0 – 20% for risk analysis purposes. For risk analysis, we varied the plant salary between $40K and $52K to address a degree of uncertainty.

1.4.6 Element 2.2b – DCMC Personnel (Additional for Inactives)

To calculate this cost element, we took the number of DCMC CAS FTEs as identified in this alternative (4.3), multiplied it by the average AAP CAS salary ($46K), and multiplied it by the DCMC burden factor (1.8). (Since they are DCMC employees, we use the DCMC burden factor.) This cost estimate is in years 2000 and 2001. However, from years 2002 through 2009, we decreased the number of DCMC FTEs at the CAO by 10% per year calculating a range of 0 – 20% for risk analysis purposes. For risk analysis, we varied the plant salary between $40K and $52K to address a degree of uncertainty.

1.4.7 Element 2.2c – AAP CAS Personnel (Actives)

Unlike alternative A-1B, there are costs under this element since some of the active CAS personnel remain AAP employees. This total number of AAP FTEs (45) was multiplied by the average active/inactive plant salary ($46K) and the active/inactive plant "burden factor" (1.67). This cost estimate was then applied from years 2000 through 2009. For risk analysis, we varied the plant salary between $40K and $52K and the burden factor between 1.65 and 1.8 to address a degree of uncertainty.

1.4.8 Element 2.2d – AAP CAS Personnel (Inactives)

Like element 2.2c, 2.7 FTEs remain AAP billets. This number of CAS FTEs was then multiplied by the average AAP CAS salary ($46K), and then multiplied by the AAP burden factor (1.67). (Since they remain AAP employees, we use the AAP burden factor.) From 2007 through 2009, we removed the Kansas facility non-CAS FTEs since, according to the IOC, they will be closed by then. For risk analysis, we varied the plant salary between $40K and $52K and the burden factor between 1.65 and 1.8 to address a degree of uncertainty.

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APPENDIX I
DEFINITIONS

Appendix I - Definitions

Federally Funded Research and Development Center (FFRDC) were first established after WWII. There are three types of FFRDCs:

- Study and Analysis Centers - Seven centers provide objective evaluation of complex issues
- Engineering and Integration Centers - Two centers provide engineering and technical support for DoD research and engineering centers
- Research and Development Centers - leverage basic research and advanced development programs in support of DoD material development

There are two university affiliated FFRDCs:

- Massachusetts Institute of Technology, Lincoln Laboratories
- Carnegie Mellon, Software Engineering Institute

University Affiliated Research Centers - The DoD sponsors six not-for-profit, private and State University integrated laboratories, identified below. The relationship between the UARC and DoD sponsoring agency is long-term and strategic. Each UARC receives annual sole-source funding in excess of $2 million to establish and maintain essential research, core development and engineering capabilities. They operate in the public interest, free from conflicts of interests.

Institution	Description
Johns Hopkins University Applied Physics Laboratory	• Invented the concept of satellite navigation that led to modern global positioning capabilities • Played a pivotal role in inventing, developing and prototyping the Navy's Cooperative Engagement Capability
Penn State University Applied Research Laboratory.	• Responsible for the design of 21 advanced propulsors and hydrodynamics devices for Navy surface ships, submarines and torpedoes • Conceptualized and demonstrated the key enabling technologies and supporting research for advanced ship self-defense decoys
The University of Washington Applied Physics Laboratory	• Solved the torpedo influence exploder problems • Currently directing research at understanding the physics of ocean processes to better predict the performance of underwater systems
The University of Texas Applied Research Laboratory	• Developed the ground station equipment used to track TRANSIT

Institution	Description
	(navigation) satellites • Building the prototype of the MAXUS sonar that will replace mine avoidance sonar on attack submarines
Utah State University Space Dynamics Laboratory	• Designed and built the Midcourse Space Experiment's Spirit III telescoped infrared sensor and functionally • Demonstrated the feasibility of a Space-based Infrared low-earth-orbit surveillance concept
The Georgia Tech Research Institute	• Designed and constructed the world's largest compact antenna test range for the Army