Helicopter Deck Landing Qualifications (DLQs): A Cost-Benefit Analysis of Comparative Alternatives

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MONTEREY, CALIFORNIA

EMBA PROJECT REPORT

Helicopter Deck Landing Qualifications (DLQs):
A Cost-Benefit Analysis of Comparative Alternatives

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EXECUTIVE SUMMARY

This project was completed by the Resource Management Solutions Group, on behalf of the Commander, Helicopter Sea Combat Wing Atlantic (CHSCWL), and facilitated through the Naval Postgraduate School Executive MBA program. The purpose is to collect and analyze data pertaining to current scheduling challenges for helicopter pilot deck landing qualifications (DLQs). The data is used to compare three potential courses of action (COAs) and provide a recommendation for a COA to pursue based on the lowest cost alternative that meets operational requirements.

This study focuses on the MH-60S helicopter squadrons assigned to CHSCWL. Sortie data was gathered from the Helicopter Sea Combat Squadron Two and interview data collected from various Norfolk-based MH-60S squadrons was incorporated as well. This project focuses primarily on two areas of interest: alleviating the DLQ scheduling challenges experienced between CHSCWL and the United States Second Fleet (C2F) and finding the most cost effective solution that also meets the operational requirements of the Fleet Replacement Squadron (FRS), Fleet squadrons, and ships assigned to C2F. Our analysis examines three possible courses of action:

- COA 1: Continue to conduct DLQ events using the current process of utilizing fleet ships already underway for training
- COA 2: Dedicate a C2F duty ship with sole responsibility of conducting DLQ events for a specified period of time during its duty rotation
- COA 3: Award a civilian company a contract to utilize a Helicopter Landing Trainer (HLT) to conduct DLQ events in the Chesapeake Bay or James River

The results show all three COAs are capable of meeting DLQ requests; however, COA 3 provides the best solution for two main reasons. A Helicopter Landing Trainer allows for the highest level of operational readiness and minimizes the scheduling difficulties that have been experienced with DLQ requirements. Additionally, using a cost comparison, COA 3 proves to be the least costly alternative. The decision to utilize an HLT would potentially yield an annual savings of nearly $1.0 million.

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I. INTRODUCTION AND BACKGROUND

A. INTRODUCTION

Commander, Helicopter Sea Combat Wing Atlantic (CHSCWL) has identified a problem in scheduling Deck Landing Qualification (DLQ) events for helicopter squadrons based at NAS Norfolk utilizing underway ships assigned to Commander, United States Second Fleet (C2F). Landing on the decks of ships that are underway is a critical skill for Naval Aviators and one that must be practiced periodically to maintain currency and proficiency. With demanding work-up and deployment schedules of Naval vessels in the Norfolk area, operations officers from CHSCWL and C2F have found it challenging to schedule and complete the optimum number of DLQ events required to maintain the qualification and currency of CHSCWL's H-60 and H-53 squadron pilots and aircrew. The scheduling problem is set to become even more difficult as five more helicopter squadrons will be permanently moved to NAS Norfolk from NAS Jacksonville and NAS Corpus Christi over the next four years; increasing the DLQ requirement by as much as 25 percent. This project analyzes the costs and benefits of the current system with the increased DLQ demand and compares it with two alternatives. Each of these alternatives involve utilizing a dedicated ship that CHSCWL can use to support the necessary DLQ requirements, while simultaneously minimizing the impact the increased DLQ requirements will have on C2F ships conducting their own required at-sea training.

B. BACKGROUND

Naval helicopter pilots are required to qualify at landing on the deck of an underway vessel and then maintain that qualification from the time they are in the training command through the time they are part of an operational squadron. This qualification must be refreshed periodically to maintain currency, as directed by Naval Air Training and Operating Procedures Standardization (NATOPS). For example, every 90 days an H-60 pilot must perform six day landings and six night landings in order to maintain currency on single-spot flight deck ships such as frigates or destroyers. The Commander, Naval Air Forces Atlantic (AIRLANT) directs that based on a squadron's

turnaround cycle, it must maintain a certain number of current pilots to meet acceptable Training and Readiness (T&R) standards. CHSCWL coordinates with C2F to schedule ships to conduct the necessary DLQ events throughout the month to maintain these pilot qualifications. CHSCWL has determined that in order to maintain *minimum* T&R standards, the Wing *must* complete at least 12 DLQ events per month given the current demand (an event consists of 1 six hour period that usually lasts from three hours prior to three hours after sunset). The arrival of five additional squadrons expected at NAS Norfolk will increase the DLQ requirements to *at least* 15 DLQ events per month.

U.S. Second Fleet ships have personnel onboard involved in flight operations that use DLQ events for their training and currency as well. These shipboard personnel currency requirements are much less stringent than aircrew currency requirements, however. Many of the DLQ events the ships are tasked to participate in are therefore unnecessary and take time away from other training evolutions the ships would otherwise be conducting. Any increase to the minimum requirements (such as the pending increase from 12 to 15 monthly events) will put an even greater burden on these ships and, in turn, result in longer periods at sea to complete these events. This translates to additional costs to the Navy and hardships for personnel onboard.

For a myriad of reasons, including weather, sea state, and ship malfunctions, DLQ training opportunities are frequently lost or cancelled. As displayed in Appendix A, approximately 55% of scheduled events are completed each year. Since only the minimum required DLQ events are *scheduled* with C2F, any cancelled DLQ training opportunities that are not rescheduled can create lapses in squadron currency requirements and extended "time-to-train" the Fleet Replacement Squadron (FRS) students.

Although the current system of using Norfolk based Navy ships for DLQ events has been used for years, CHSCWL believes that the current system does not provide enough DLQ events for ideal readiness posture. The current system also strains C2F since it has numerous other obligations and duties it must fulfill. Over the next four years, the addition of squadrons, pilots, and DLQ requirements to NAS Norfolk will provide an additional burden that the current system will struggle to support.

C. PROJECT OBJECTIVES

The first objective was to evaluate the current process of scheduling and conducting DLQ operations and determine if the process could be expanded to include the additional requirements created by the squadrons arriving from NAS Jacksonville and NAS Corpus Christi. This objective also determined the *cost* of using the current method (COA 1) to schedule ships already at sea to conduct the estimated monthly requirement of 15 DLQs.

The second objective was to conduct a cost and readiness analysis of two additional alternatives. Both alternatives involved designating a ship to be a dedicated asset for CHSCWL to conduct DLQ operations as needed. These dedicated assets consisted of the following:

COA 2: A Naval warship that will provide dedicated DLQ support to CHSCWL for a set number of days per month on a rotating basis (a duty ship).

COA 3: Acquiring a dedicated Helicopter Landing Trainer (HLT) similar to the IX-514 (pronounced India X-ray Five-One-Four) used for DLQ operations in the helicopter training command in Pensacola, FL.

The end result is a recommendation of the best course of action to pursue for both cost savings and increased readiness.

D. PROJECT SCOPE

This is a study of the *current method and two alternatives*. Although the client and we feel that these are the most reasonable alternatives to pursue, there may be other alternatives that we did not consider. When calculating costs, it was assumed that while ships are conducting DLQ events, they could simultaneously conduct some other required training. For this reason, unless a ship is specifically underway to conduct DLQ operations, we do not consider their operating costs in our analysis. If ships are underway specifically as the duty-ship, however, we consider the fuel and repair costs for that underway period as relevant additions to the total cost of conducting DLQ events. We did not consider the increase in Reimbursables a ship incurs while at sea vice being in port. Additionally, although it should be acknowledged that there are intangible costs

associated with sailors' personal lives when kept at sea for additional time; we did not factor those into our calculations. Furthermore, although there are one-time expenses associated with "getting a ship underway" from the pier to open ocean, we did not consider those costs. We also did not consider in what manner C2F and CHSCWL should share the cost responsibility of using a civilian ship alternative. Finally, some of the current and future DLQ scheduling pressure could be alleviated if the Fleet Replacement Squadron did not mandate that students can only qualify on warships that have multiple landing spots, thus creating a disproportionate task load for Amphibious class ships that meet this requirement. Since that decision was made for safety reasons, however, this project does not address the possibility of changing that policy.

E. METHODOLOGY

Data for this project was collected primarily from three sources. Those sources were CHSCWL, C2F, and Metson Marine, Inc. (the corporation that operates the IX-514 in contract with the Navy). Some of the data was collected from individual squadrons within CHSCWL. Most of the interview questions involved costs, but some also involved feasibility and operational necessity.

Only relevant cost data was considered in the calculations. Sunk costs and costs that would be incurred no matter which alternative was selected were kept out of the comparisons. We obtained data from CHSCWL and squadrons on items such as the fuel costs associated with average aircraft transit and loiter time, statistical completion rates of DLQ events, and projected DLQ event requirements for CHSCWL once all the expected additional squadrons arrive at NAS Norfolk.

From C2F, we obtained the hourly costs associated with DLQ events to keep the ships at sea [broken down by class of ship]. We also determined how often ships request helicopter operations to keep their own personnel certified. To determine the costs of the alternative of having a dedicated warship as an asset CHSCWL can utilize as they see fit, we took into consideration what type of ship would be necessary to fill that role and determined the cost to keep that ship at sea for that length of time.

Finally, we obtained information from Metson Marine, Inc., the company that operates the IX-514. We collected details such as current Navy contract costs and information on availability of other such vessels for this purpose.

From a feasibility standpoint, questions were directed to C2F to consider the projected future requirements estimated by CHSCWL. We determined the feasibility of the fleet to support a 25 percent increase in DLQ requirements. Additionally, we considered the possibility of C2F providing one ship as a dedicated asset for CHSCWL to fill DLQ demand and what expected length of time they could be made available.

F. DATA ANALYSIS

Appendix B provides a cost comparison between the current method of conducting DLQ events and two alternatives. Data was collected from interviews of several squadron operations officers, the CHSCWL operations department, and the C2F finance department. The results of our data analysis are listed in the section below.

G. ASSUMPTIONS

In our analysis, several assumptions have been made and are listed below:

- If a ship that is already underway to conduct scheduled training is used for a DLQ event, then the fuel costs for that ship are considered sunk. This is because ships can simultaneously perform required training for the ship and support DLQ operations.
- If a ship is scheduled to stay at sea longer than the time it requested in order to fulfill DLQ requirements, the costs to keep that ship at sea for the extra day are considered.
- If a ship is scheduled to be underway exclusively to conduct DLQ events (i.e. a duty ship), then the costs to keep that ship at sea are considered.
- Underway fuel costs for ships are calculated using the current fiscal year cost of $69.30 per barrel of DFM. Of note, the previous year's cost per barrel was $170.52.
- Only the marginal fuel costs of keeping ships at sea are considered (the difference between barrels burned underway and barrels burned in port).
- The cost per gallon of JP-5, used for MH-60S fuel burn calculations, is $1.68 for the current fiscal year. Of note, the previous year's cost per gallon was $4.09.

- A civilian vessel's utilization is considered to be based on a nine hour work day to complete 1.5 DLQs per day.
- A DLQ event is considered a six hour period and typically occurs between three hours before to three hours after sunset.
- Port costs involved with getting a ship underway from the pier to open ocean, although potentially substantial, were not considered.

II. RESULTS

A. CURRENT PROCESS (COA 1)

Cost and readiness calculations were developed from data provided by CHSCWL, C2F, and interviews with squadron operations officers. The present-day requirement for DLQ events calls for a demand of 12 per month. As mentioned previously, additional squadrons are anticipated to arrive at NAS Norfolk over the next few years. According to CHSCWL, the presence of the additional squadrons will raise the monthly requirement to 15 DLQ events per month.

1. READINESS

Currently, C2F and CHSCWL coordinate ship schedules with squadron requests to fill the DLQ demand of 12 events per month. Appendix A shows the average completion rate for DLQ events over the past year was 55 percent. Adjusting the data to not include events that canceled due to helicopter malfunctions or weather ceiling limits, the average completion rate was 51 percent. Although some events are rescheduled and conducted on a later date, both CHSCWL and C2F acknowledge that cancellations are very difficult to reschedule. The result creates a potential reduction in readiness, even at the current demand of 12 DLQ events per month. Due to the strain already placed on C2F ships to fill the DLQ requirements, any additional event over the current demand will most likely require the use of a duty ship to supplement training operations or additional time at sea for DLQ ships already underway. Given the projected arrival of additional squadrons, COA 1 presents significant risk of not meeting readiness requirements due to scheduling challenges and the inability to maintain flexibility in the event of maintenance or weather cancellations.

2. COST

Appendix B provides all cost calculations. Costs were calculated as helicopter costs, ship costs, and the total cost to conduct DLQ operations on a monthly basis. Since fleet ships that conduct DLQ operations typically operate in the open ocean, the extra fuel costs for helicopters to transit further out to sea were considered. Since DLQ periods for the scheduled ships are typically scheduled three hours before to three hours after sunset,

a helicopter needs only to make one round trip to the ship to complete its events. Also, helicopters typically must loiter overhead a ship before the deck is ready for the aircraft to land as well as while another helicopter is refueling on the deck. These loiter costs are considered in our calculations.

Additionally, from interviews with squadron operations officers, a cancellation factor of 10 percent has been assigned as a cost. This cost is incurred as a result of a helicopter transiting to and from a ship, but not completing the event due to ship malfunctions. As expressed in the "Assumptions" section above, the ship costs of the first 12 DLQ events per month are considered sunk because that amount has been historically met without requiring ships to undergo additional days at sea. To meet the expected 15 DLQ requests per month, the additional days underway result in a cost of $82,483. These costs are fuel-day and repair-day costs, and do not include the additional Reimbursable costs associated with being underway. Table 1 below displays the estimated monthly costs to conduct 15 DLQ events using the current method:

TABLE 1 – MONTHLY COSTS TO CONDUCT 15 DLQ EVENTS USING CURRENT METHOD

HELICOPTER COSTS	$72,654
SHIP COSTS	$82,483
TOTAL COST PER MONTH	$155,137

B. DUTY SHIP ALTERNATIVE (COA 2)

To help alleviate the strain created by the increase in DLQ requirements, one consideration is a duty ship. DLQ requests from the Fleet Replacement Squadron and H-53 squadrons require the use of a ship with multiple landing spots on its deck. Because of the large number of requests for this multi-spot criterion, the only reasonable ship to assign the duty responsibility would be an Amphibious class warship with multiple spots.

1. READINESS

According to C2F, due to the limited availability of large Amphibious class warships, a duty ship would get underway exclusively to conduct DLQ events for at most eight days per quarter (or 2.7 days per month). Assuming a duty ship would operate for 12 hours per day, this equates to 5.3 DLQ events per month. This number falls well short

of the 15 events required, and so a duty ship alone cannot fulfill the readiness requirements, but instead would serve as a supplement to the current process. The result is a 9.7 DLQ/mo requirement using the current process of scheduling ships already training underway. Therefore, from a readiness perspective, this option alleviates *some* of the scheduling demands but still requires extensive use of other underway C2F ships.

2. COST

Cost assumptions are nearly identical to the cost assumptions under the current method. Since a duty ship will most likely be used for 12 hour periods; the cost of transit is doubled in some cases because pilots who fly DLQ events during the first three hour block of time would have to fly back to the ship for a second three hour block of time at night. Since the duty ship would be underway exclusively to conduct DLQ events, the entire fuel-day and repair-day costs for each day the ship would be scheduled are considered. One cost that was not obtainable for this project, but would make this option even more expensive, is the specific cost of getting underway for duty ship responsibilities. Table 2 below displays the estimated monthly cost to conduct 15 DLQ events per month using a duty ship to supplement the current method:

TABLE 2 –MONTHLY COSTS TO CONDUCT 15 DLQ EVENTS USING DUTY SHIP SUPPLEMENT

HELICOPTER COSTS	$81,711
SHIP COSTS	$70,933
TOTAL COST PER MONTH	$152,644

C. CONTRACT HELICOPTER LANDING TRAINER (COA 3)

The IX-514, currently used at NAS Pensacola, provides a reasonable alternative to the current process and the use of a duty ship. Due to its small size and shallow draft a vessel such as this could operate in protected waters that are close to the helicopter base such as the Chesapeake Bay or James River.

1. READINESS

A civilian vessel would provide an “on call” asset to CHSCWL that could easily fulfill the monthly DLQ demand. On average, the contract ship would operate for nine

hours per day, resulting in 1.5 DLQ events per scheduled day. The result is an estimate to use the ship for eight days per month, totaling the equivalent of 12 DLQ events. The remaining DLQ events could be conducted on fleet ships already at sea, thus fulfilling their currency requirements as well. Due to its operation in protected waters, cancellations due to heavy sea state conditions will also be reduced. The bottom line is that readiness numbers can easily be filled using a civilian ship alternative.

2. COST

Due to the existence of a similar vessel already being used by the Helicopter Training Command in Pensacola, FL, cost data can be reasonably predicted. The current contract between the Military Sealift Command and Metson Marine, Inc. stipulates a $5,100 per day charge for every day the IX-514 is used. We assume the vessel will operate for nine hours each day it is scheduled, which results in a ship cost per month of $40,800. Other costs, such as the acquisition of the Helicopter Landing Trainer (HLT) were not considered because these costs are paid by the contractor providing the service.

Due to the close proximity of the Chesapeake Bay and the James River to NAS Norfolk, the transit time and fuel required for helicopters will be reduced significantly. Also, the cancellation factor has been reduced to zero because the contract vessel could easily notify helicopters on deck via radio if there was a maintenance or weather issue and prevent them from taking off. Finally, loiter times and associated costs are reduced because helicopters will be able to refuel at NAS Norfolk, instead of the deck of the Navy ship. This will allow other helicopters to continue executing DLQ events since refueling will not crowd the landing area. Table 3 displays the estimated monthly cost to conduct 12 DLQ events per month using a contracted civilian ship and 3 DLQ events in C2F ships:

TABLE 3 –MONTHLY COSTS TO CONDUCT 15 DLQ EVENTS USING AN HLT

HELICOPTER COSTS	$41,737
SHIP COSTS	$40,800
TOTAL COST PER MONTH	$82,537

Table 4 displays a compilation of the total monthly and annual costs to execute each alternative.

TABLE 4 – FUEL COST COMPARISON BETWEEN ALL ALTERNATIVES

	CURRENT METHOD	DUTY SHIP	CIVILIAN VESSEL
TOTAL MONTHLY COST	$155,137	$152,644	$82,537
TOTAL ANNUAL COST	$1,861,644	$1,831,728	$990,441

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III. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Our first objective was to evaluate the current process and determine the feasibility of expanding it to include the additional requirements of the squadrons arriving from NAS Jacksonville and NAS Corpus Christi (COA 1). We have determined that the current process, although incurring an even greater scheduling strain, could still support the increase to 15 DLQ events per month, but that increase would come with some costs. To increase from 12 to 15 DLQ events per month would require ships to remain at-sea an additional day for any DLQ events above the current level, specifically three additional days for the projected new DLQ requirement. This would create a large increase in costs for conducting DLQ events due to the high costs of ships being underway for that extra time. The specific comparative costs of this method can be seen in Appendix B.

Our second objective was to analyze two alternatives to meet the increased DLQ demand and determine which option was the most cost effective. Both alternatives involved designating a ship to be a dedicated asset for CHSCWL to conduct DLQ operations as needed, either a duty ship or a Helicopter Landing Trainer. The data shows that both methods would relieve the scheduling strain and provide adequate opportunities for CHSCWL to maintain pilots' deck landing qualifications, however, a cost comparison clearly shows that the option to utilize an HLT for the majority of DLQ requirements is the least expensive option and is 54% as expensive than the cost of using a duty ship (Appendix B). Even though the duty ship option has been proposed by C2F as the likely next step in relieving the current scheduling strain, data indicates that this option is only barely cheaper than adding three additional DLQ events to the current method. This is because of the limited about of time that an Amphibious class ship can be made available for this purpose. The option of contracting an HLT is approximately 47% cheaper than the cost of continuing with the current method, and the data even shows that the *total* cost of utilizing the HLT is nearly as much as the cost of the fuel *alone* that the helicopters burn conducting operations under the current method since the ships are often so far off the coast. Therefore, the Navy would actually be burdened with a significant cost by doing nothing and continuing to "make it happen" with the assets it currently has.

B. RECOMMENDATIONS

The Resource Management Solutions Group recommends that CHSCWL and the Navy choose COA 3 and employ the services of a Helicopter Landing Trainer such as IX-514. COA 3 has not only shown to be the most feasible in terms of availability, it is also the most cost effective. Our calculations were conducted assuming a contractual rate of $5,100 per day. At the current fuel prices, COA 3 proves to be the most cost-effective solution even if the daily contract cost for the HLT was as high as $11,860 per day. This option also permits optimum scheduling availability, allowing a contracted amount of dedicated DLQ periods for CHSCWL aircraft each week. The use of an HLT permits shorter transit times for NAS Norfolk based helicopters which greatly reduces costs and lost training time. The short transit time also enables the helicopters to use the NAS Norfolk Heliport hot-refuel pits which would eliminate the requirement for shipboard refueling. Traditionally, DLQ operations are often delayed during shipboard refueling operations due to low fuel hose pressure and a mandatory red deck condition while the refueling evolution is in progress. In addition, the HLT would be operable in less volatile waters such as the Chesapeake Bay or James River which would decrease lost DLQ evolutions due to high sea states. Cancellations are not only frustrating, but lead to lapses in readiness and increased "time-to-train" for FRS students, so any reduction to their frequency also provides intangible savings in cutting down the time required to qualify a student pilot. COA 3 also gives CHSCWL aircraft the flexibility to schedule C2F ships as needed. Along with the current availability of C2F ships, the use of a contracted HLT gives CHSCWL the optimum solution for maintaining pilot and aircrew qualifications, currency, and readiness.

Annually, utilizing an HLT will save the Navy $871,200 at today's fuel prices as compared to COA 1. This figure does not include the intangible time-to-train savings mentioned above. If fuel prices climb back to the level that they were during the previous year ($171.78/bbl for JP-5 and $170.52/bbl for DFM), then utilizing the HLT will save the Navy $2,034,000 annually. This is a *significant* monetary savings that the Navy ought to pursue soon before the additional squadrons arrive and DLQ scheduling demands are even greater.

C. OTHER CONSIDERATIONS

Areas that may require further study prior to implementation:

1. Ability of a civilian vessel to regularly conduct DLQ operations within the Chesapeake Bay or James River
2. Additional expenses other than fuel-day and repair-day costs associated with getting and maintaining a ship underway
3. Potential benefit to the quality of life for sailors due to reduced at-sea time
4. Existence of a civilian company in the Hampton Roads area with both a ship and the capability to conduct DLQ operations

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LIST OF SUBJECT MATTER EXPERTS INTERVIEWED

1. LCDR Alan Copeland
   CHSCWL
   NAS Norfolk, VA
2. LT Steve Gnilka
   CHSCWL
   NAS Norfolk, VA
3. LCDR Brian Chiles
   C2F
   Norfolk Naval Base, VA
4. Operations Department
   HSC-2
   NAS Norfolk, VA
5. Operations Department
   HSC-26
   NAS Norfolk, VA
6. Operations Department
   HSC-28
   NAS Norfolk, VA
7. Supply Department
   HSC-2
   NAS Norfolk, VA
8. Bob Yost
   IX-514
   Pensacola, FL
9. Metson Marine, Inc.
   Ventura, CA

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APPENDIX A - HSC 2 DLQ SNAPSHOT
AINING (JAN08 - JAN09)

Date	# A/C	Ship	Hrs Flown	X's Scheduled	X's Completed	Currency/Requal X's sched	Currency/Requal X's comp	Completion Rate %	X's Per Hour	Pilots Qual/DLQ	Reason for less than 100%:
8-Jan	2	USNS PATUXANT	10	14	14	0	0	**100.00**	**1.40**	**4.20**	
15-Jan	1	Unknown	6	0	0	3	2	**66.67**	**0.33**	**1.00**	Maint.
25-Jan	1	USS MCFAUL (DDG 74)	6.8	4	4	1	1	**100.00**	**0.74**	**2.21**	
21-Feb	1	USNS SATURN (T-AFS 10)	6.0	8	8	0	0	**100.00**	**1.33**	**4.00**	
21-Feb	1	USS MITSCHER (DDG 57)	6.8	4	4	2	0	**66.67**	**0.59**	**1.76**	Ran out of Time
11-Mar	2	USNS SATURN (T-AFS 10)	14.8	22	18	0	0	**81.82**	**1.22**	**3.65**	Ran out of Time
19-Mar	1	USNS SATURN (T-AFS 10)	6.5	12	10	0	0	**83.33**	**1.54**	**4.62**	Ran out of Time
26-Mar	1	USNS SATURN (T-AFS 10)	4.0	10	4	0	0	**40.00**	**1.00**	**3.00**	Wx
27-Mar	1	USNS SATURN (T-AFS 10)	1.5	8	0	0	0	**0.00**	**NA**	**0.00**	Wx
1-Apr	1	USNS SATURN (T-AFS 10)	1.5	8	0	0	0	**0.00**	**NA**	**0.00**	Wx
21-May	2	USS MESA VERDE (LPD 19)	14.0	22	18	1	0	**78.26**	**1.29**	**3.86**	Ran out of Time
10-Jun	1	USS LABOON (DDG 58)	5.0	0	0	3	1	**33.33**	**0.20**	**0.60**	Ship
11-Jun	2	USN LEROY GRUMMAN (T-A	12.5	14	14	1	1	**100.00**	**1.20**	**3.60**	
16-Jun	1	USNS LEROY GRUMMAN	1.0	0	0	3	0	**0.00**	**NA**	**0.00**	Maint/ Wx
11-Aug	1	Unknown	0.0	12	0	0	0	**0.00**	**NA**	**NA**	Cat 1 Policy chg
18-Aug	1	USS CARR (FFG 52)	6.5	0	0	4	3	**75.00**	**0.46**	**1.38**	Emergency leave
26-Aug	1	Unknown	0	11	0	0	0	**0.00**	**NA**	**NA**	Ship Broke
20-Oct	2	USS WHIDBEY ISLAND	5	15	2	1	0	**12.50**	**0.40**	**1.20**	Sea State
4-Nov	1	USNS KANAWHA	0	2	0	2	0	**0.00**	**NA**	**NA**	Boat Canx
12-Nov	1	USS JAMES E. WILLIAMS	3.5	0	0	4	4	**100.00**	**1.14**	**3.43**	
18-Nov	1	USNS SATURN (T-AFS 10)	0	8	0	0	0	**0.00**	**NA**	**NA**	Boat Canx
19-Nov	2	USNS SATURN (T-AFS 10)	13.1	14	7	1	1	**53.33**	**0.61**	**1.83**	Ran out of time
2-Dec	2	USNS KANAWHA	11.9	13	13	0	0	**100.00**	**1.09**	**3.28**	
3-Dec	1	USNS KANAWHA	4.5	6	6	1	0	**85.71**	**1.33**	**4.00**	Pilot ORM
16-Dec	2	USNS JOHN LENTHALL	0	3	0	5	0	**0.00**	**NA**	**NA**	WX
13-Jan	1	Unknown	7	9	5	1	1	**60.00**	**0.86**	**2.57**	Wx
		Totals		**420**	**240**	**47**	**26**				

Ave comp rate attributed to ship and WX:	**51%**
Average Completion Rate:	**55%**
Pilots qualified per DLQ event:	**2.57**
Pilots qual'd / DLQ event (not considering weather):	**2.81**

APPENDIX B - DLQ COST CALCULATIONS

Research Findings

CHSCWL

Monthly DLQs required by CHSCWL (projected)	15	
Average distance from KNGU for DLQ	50	NM
Average speed for transit to fleet ship	120	KTS
Average time for transit to fleet ship	25	MIN
Average loiter time preparing for ready deck	20	MIN
Fuel burn rate for transit / loiter	1000	LBS/HR
Completion Rate	51%	
Percentage of time DLQ cancelled after launch (C2F)	10%	
(ship mx, comm, sea state, wx)		
Average fuel burned for cancelled hops	1167	LBS
Cost per gallon JP-5 $ 1.68	Cost/pound $ 0.2507	
(lbs/gal: 6.7)		
Number of pilots qual'd in 1 ship DLQ event	2.57	
Number that could complete in 12hr block	5.14	
Maximum pilots could qual on duty ship / month	13.7	
Average miles off coast for IX-514	15	NM
Average transit time to IX-514	7.5	MIN
Average loiter time for ready deck (IX-514)	5	MIN
Percentage of time DLQ cancelled after launch (IX-514)	0%	
(IX-514 mx, comm, wx)		
Average fuel burned for cancelled IX-514 hops	250	LBS
Number of pilots qual'd in 1 IX-514 DLQ event	3.5	
Maintenance cost per flight hour	$ 1,800	

C2F

Maximum DLQ capacity per month without increasing underway time	12	DLQs
Add'l underway days/mo for increased DLQ:	3	Days
Days per quarter Duty ship can be available	8	Days
Days per month Duty ship can be available	2.7	Days
Hours per day Duty Ship avail for flight ops	12	Hours
DLQ periods/month	5.3	
Additional DLQ periods required per month	9.7	DLQs
Underway Fuel Costs: DFM / bbl	$69.30	

Class	U/W bbl	In Port bbl	Fuel $/Day	Fuel $/hr	Other $/day	Total $/day
LHA1	903	360	$37,630	$1,568	$ 8,040	$ 45,669
LHD1	918	430	$33,818	$1,409	$ 8,040	$ 41,858
LPD4	395	211	$12,751	$531	$ 8,040	$ 20,791
LPD17	336	171	$11,435	$476	$ 5,590	$ 17,024
LSD41	254	96	$10,949	$456	$ 5,590	$ 16,539
LSD49	251	76	$12,128	$505	$ 5,590	$ 17,717
Average Amphib cost of underway			$19,785	$824	$ 6,815	$ 26,600
CG47	580	190	$27,027	$1,126	$ 12,872	$ 39,899
DDG51	514	167	$24,047	$1,002	$ 6,737	$ 30,784
FFG7	238	59	$12,405	$517	$ 4,764	$ 17,168
Average Smallboy cost of undway			$21,160	$882	$ 8,124	$ 29,284
Average cost of all			$20,243	$843	$7,251	$27,494

IX-514

Total contract cost per day	$ 5,100
Completion Rate	95%
Number of Days needed to complete 12 DLQs	8

*Assume IX-514 used 9 hours/day

*Assume Duty ship used 12 hours/day

*12 DLQs/mo performed on HLT and 3 DLQs on C2F ships

COSTS

Current Method

Helo Costs to Conduct DLQ		
Fuel for transit:		$ 209
Fuel for loiter:		$ 84
	sum	$ 293
Cancelation Factor:		10%
	sub total	$ 322
Maintenance hour costs:		$ 2,100
	Total	$ 2,422
	2 Helos:	$ 4,844
Helo cost/month to complete 15 DLQ events		
		$ 72,654

Ship Costs to Conduct DLQ	
First 12 underway DLQs/month	$0
3 add'l DLQ/month underway (fuel)	$60,730
other costs/month	$21,753
Sub Total	$82,483

Total Cost / Month	$ 155,137

Duty Ship Alternative

Helo Costs to Conduct DLQ (if RTB b/w day/night)			
Fuel for transit:		$ 209	$ 418
Fuel for loiter:		$ 84	$ 84
	sum	$ 293	$ 501
Cancelation Factor:		10%	10%
	sub total	$ 322	$ 531
Maintenance hr costs:		$ 2,100	$ 3,600
	Total	$ 2,422	$ 4,131
	2 Helos:	$ 4,844	$ 8,261

Helo cost per month to complete 15 DLQ events			
	~5.3 on duty ship =	$ 34,728	(if half RTB b/w day and night)
	~9.7 on other ships =	$ 46,983	
Sub Total		$ 81,711	

Ship Costs to Conduct DLQ		
Fuel costs/month (amphib)		$52,760
other costs/month		$18,172
Cost of add'l 9.7 DLQ		$ -
Sub Total		$70,933

Total Cost / Month	$ 152,644

IX-514 Alternative

Helo Costs to Conduct DLQ (if RTB b/w day/night)			
Fuel for transit:		$ 63	$ 125
Fuel for loiter:		$ 21	$ 21
	sum	$ 84	$ 146
Cancelation Factor:		0%	0%
	sub total	$ 84	$ 84
Maintenance hr costs:		$ 600	$ 1,050
	Total	$ 684	$ 1,134
	2 Helos:	$ 1,367	$ 2,267

Helo cost per month to complete 15 DLQ events		
(if all RTB b/w day and night)		
	~12 on IX ship =	$ 27,206
	~3 on other ships =	$ 14,531
Sub Total		$ 41,737

Ship Costs to Conduct DLQ	
Cost/month of IX-514 (12 DLQ)	$ 40,800

Total Cost / Month	$ 82,537