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12-14 June 2007, at US Naval Academy, Annapolis, MD

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*Mission Area Analysis Branch—Analyzing the Future*

# **Analyzing the Assault and Sustainment Throughput Capabilities of the Maritime Prepositioning Force (Future) Squadron of Ships**

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14 Jun 07

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# Agenda



*Mission Area Analysis Branch—Analyzing the Future*

## ✓ **Background**

- **Overall Assumptions**
- **Surface Assault**
- **Vertical Assault**
- **Ship-to-Objective Sustainment**
- **The "Take Aways"**

# Purpose



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## ● Purpose of study

- MPF(F) Squadron Capabilities Development Document (CDD) lists:
  - ◆ Key Performance Parameters for MPF(F) at squadron level, including:
    - Air connector interfaces
    - Surface connector interfaces
  - ◆ Threshold capabilities, including:
    - Employ one surface and one vertical BLT in 8-10 hours
    - Sustain the MEB forces ashore from the sea base
- Provide insights to MPF(F) CDD working group and N85
  - ◆ Surface assault
  - ◆ Vertical assault
  - ◆ Vertical ship-to-objective sustainment

Can the squadron meet the threshold capabilities?

## ● Purpose of this brief

- Highlight the results of the study

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# Study Scope



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- **Focus on issues**
  - Timelines
  - Surface interface points
  - Surface assault connectors
  - Assault support aircraft
  - Operational deck spots
  - Ship-to-objective sustainment
- **Primary Measures of Effectiveness**
  - Time to complete assaults and sustainment
  - Operating hours

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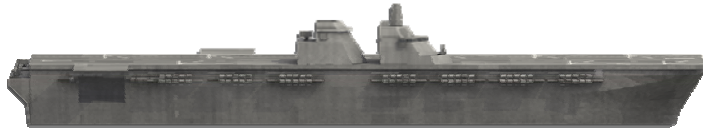
# MPF(F) Squadron Composition



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Squadron composition approved by SECNAV on 24 May 05

MPF(F)  
LHA(R)  
x 2



Artist Rendition/Notional Configuration

T-AKE  
x 3

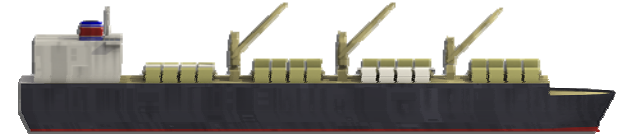


T-AKR  
x 3

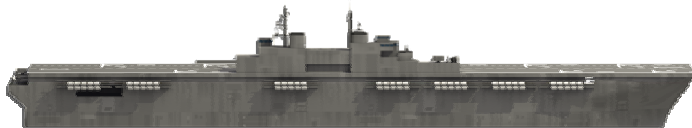
Artist Rendition/Notional Configuration



Legacy  
x 2



MPF(F)  
LHD  
x 1



Artist Rendition/Notional Configuration  
FLO/FLO Technology focused

MLP\*  
x 3



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# Agenda



*Mission Area Analysis Branch—Analyzing the Future*

- Background
- ✓ **Surface Assault**
- Vertical Assault
- Ship-to-Objective Sustainment
- The "Take Aways"

# Forces Going Ashore - Surface

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## ● Units

- 1 – Infantry Battalion
- 1 – Tank Company
- 1 – LAR Company
- 1 – LW155 Battery
- 1 – Combat Engineer Spt Det
- 1 – DS CSS Company
- 1 – LAAD Detachment

## ● Personnel/Representative Equipment

Item	Number	+ additional
PAX	1,726	183
Tanks	14	
HMMWV Wpn Carrier	32	3
HMMWV Cargo/Comm	94	25
LW155	6	
MTVR	33	15
LAV	28	
LVSR	7	12

**53 LCAC  
SLEP  
loads  
+ 18 more**

# Surface Assault Assumptions



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- 25 NM ship-to-shore
- ➔ ● Surface BLT moved to 3 MLP prior to the assault
- ➔ ● Surface BLT launched from 3 MLP
- ➔ ● 18 LCAC SLEP pre-loaded on 3 MLP
- ➔ ● 3 LCAC SLEP in MPF(F) LHD well have pre-boated Mech Co in reserve (not used for assault)
- LCAC SLEP  $A_0$ : 95% (rounded down)\*
- LCAC SLEP speeds of 35 Kts for both ingress and egress
- Significant wave height 3.0 ft (NATO SS 3)
- ➔ ● LCAC SLEP processing time of 67 minutes on MLP\*\*
  - Processing time: Time from entering MLP to exiting MLP
- LCAC SLEP unload time of 15 minutes on beach\*\*\*

14 Jun 07 \* Approved by N753L on 14Sep05, applies to surge rate for the first day of the surface assault and does not include combat attrition

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\*\* LCAC Cargo Loading Operations Onboard Amphibious Well Deck Ships, NAVSEA Panama City, 2002

\*\*\* LCAC Data Summary and Analysis, CNA, 1992

# Surface Assault Excursions



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- Land DS CSS Co and LAAD Det
- Notional LCAC(X) (N7 NCDP Study, 2005)
  - Payload weight: 279,860 lbs
  - Payload square: 2,611 SqFt
  - 12 LCAC(X) pre-loaded on 3 MLP
  - 2 LCAC(X) in MPF(F) LHD well have pre-boated Mech Co in reserve (not used for assault)
- Improved processing times\*
  - LCAC SLEP: From 67 min to 49 min
  - LCAC(X): From 92 min to 65 min
- Vary number of operational connectors



# Processing Times Comparison

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	LCAC SLEP	LCAC(X)
Current Procedures	67 min	92 min
Improved Procedures	49 min	65 min

### Current procedures\*

- NAVSEA Study 2002
- Identified discrete event steps associated with LCAC SLEP cargo loading ops

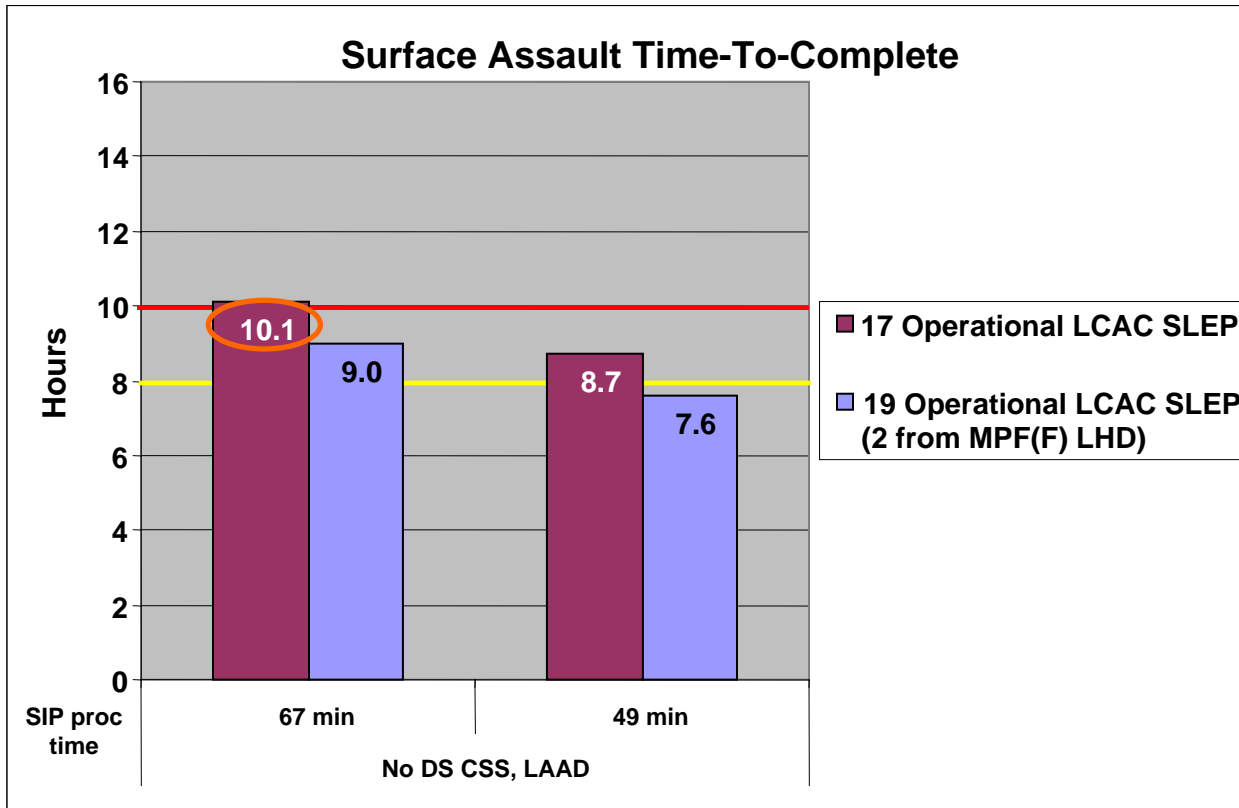
### Improved procedures\*

- NAVSEA Study 2003
- Dedicated team loading
- Concurrent passenger loading and Foreign Object Damage walk-down
- Load planning software



# LCAC SLEP Results- BLT w/out DS CSS & LAAD

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Can meet 10-hour threshold for landing surface BLT (w/out DS CSS and LAAD) with:

- Improved SIP processing time

-OR-

- Use of LCAC SLEP from MPF(F) LHD

Can meet 8-hour objective for landing surface BLT (w/out DS CSS and LAAD) with:

- Improved SIP processing time

-AND-

- Use of LCAC SLEP from MPF(F) LHD

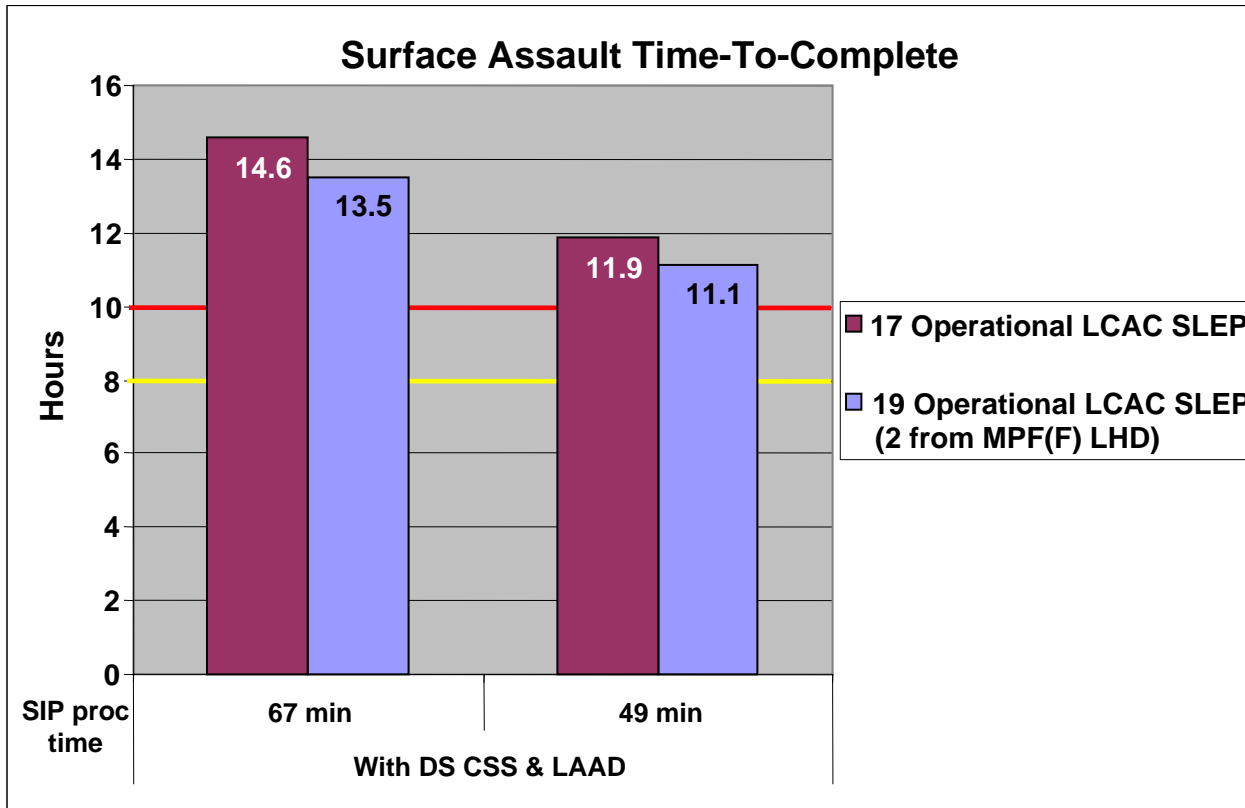
Base Case-

18 LCAC SLEP (17 Operational), No DS CSS and LAAD, 67 min SIP proc time



# LCAC SLEP Results- BLT w/ DS CSS & LAAD

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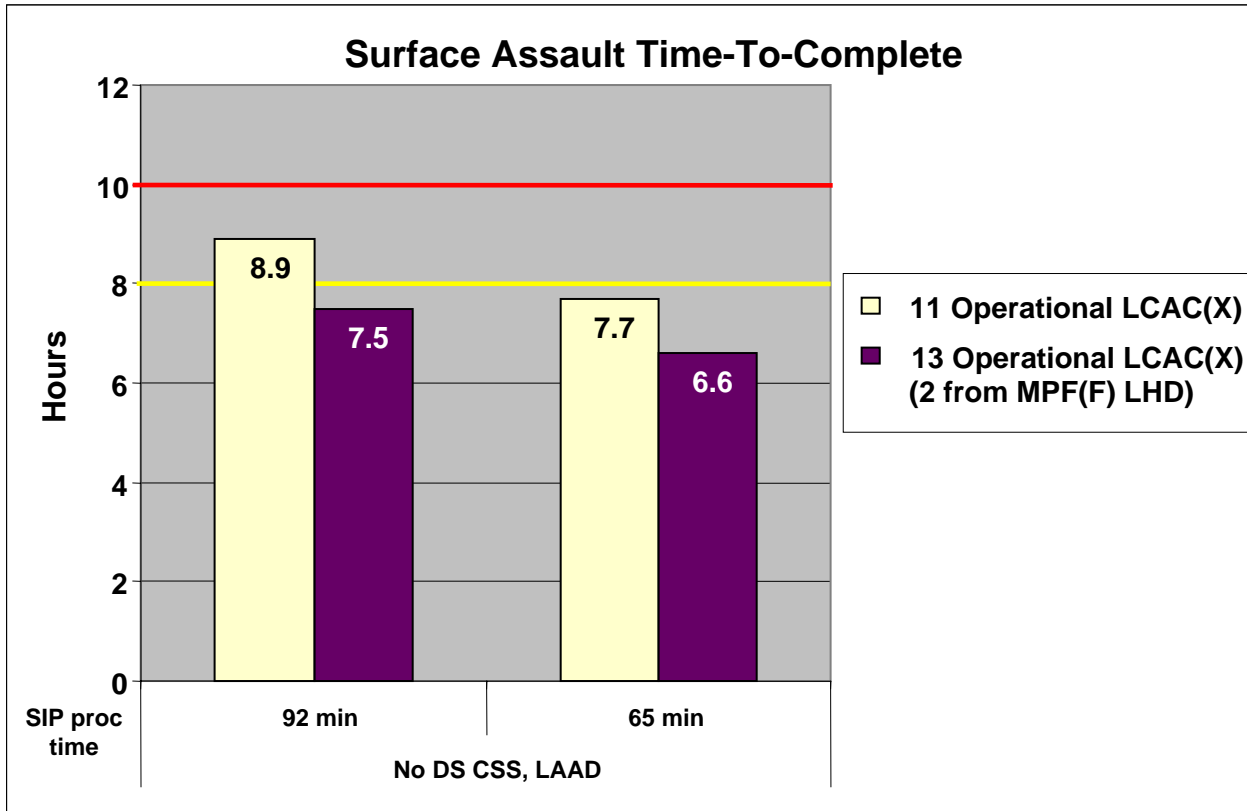
Cannot meet 10-hour threshold when landing BLT, DS CSS, and LAAD using LCAC SLEP

Best case is 11.1 hours, using LCAC SLEP from MPF(F) LHD and improved SIP processing time



# LCAC(X) Results- BLT w/out DS CSS & LAAD

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Can meet 8-hour objective for landing surface BLT (w/out DS CSS and LAAD) with LCAC(X) and

▪Improved SIP processing time

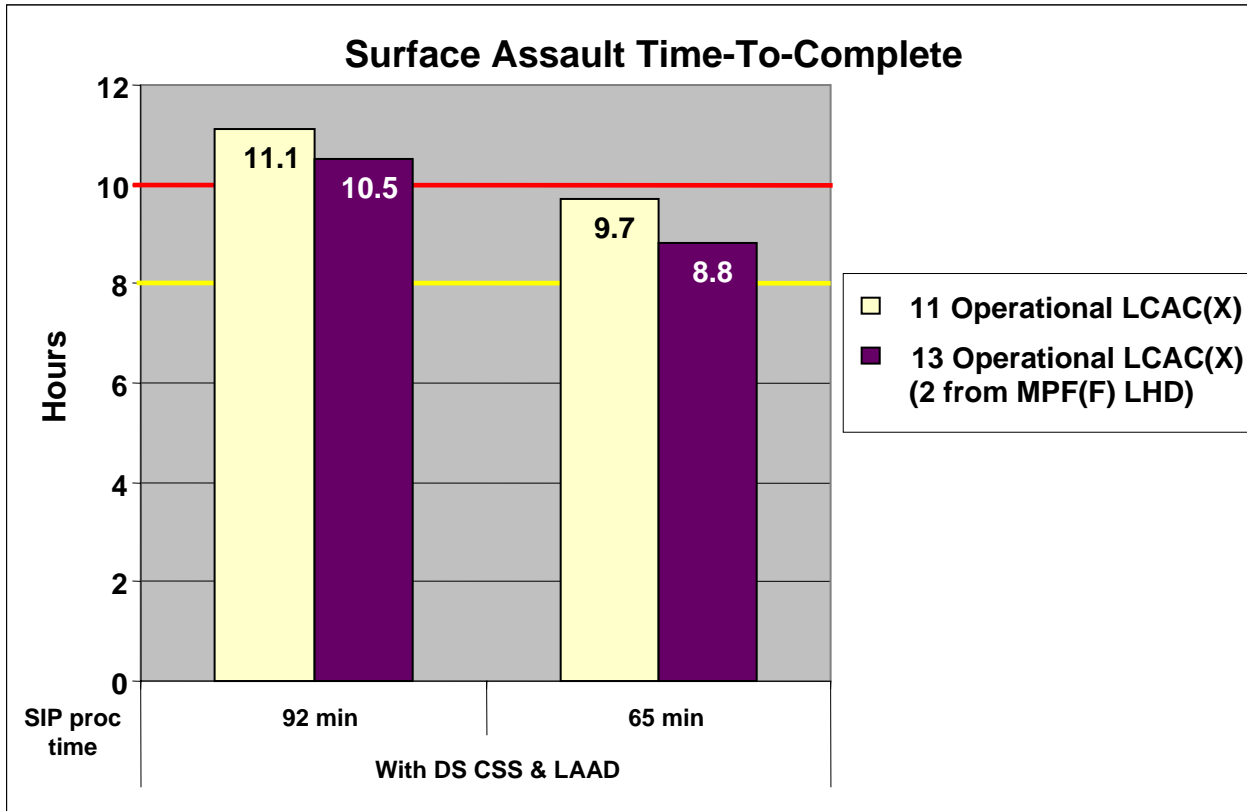
-OR-

▪Use of LCAC(X)s from MPF(F) LHD



# LCAC(X) Results- BLT w/ DS CSS & LAAD

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Can meet 10-hour threshold for landing surface BLT, DS CSS, and LAAD with LCAC(X) and

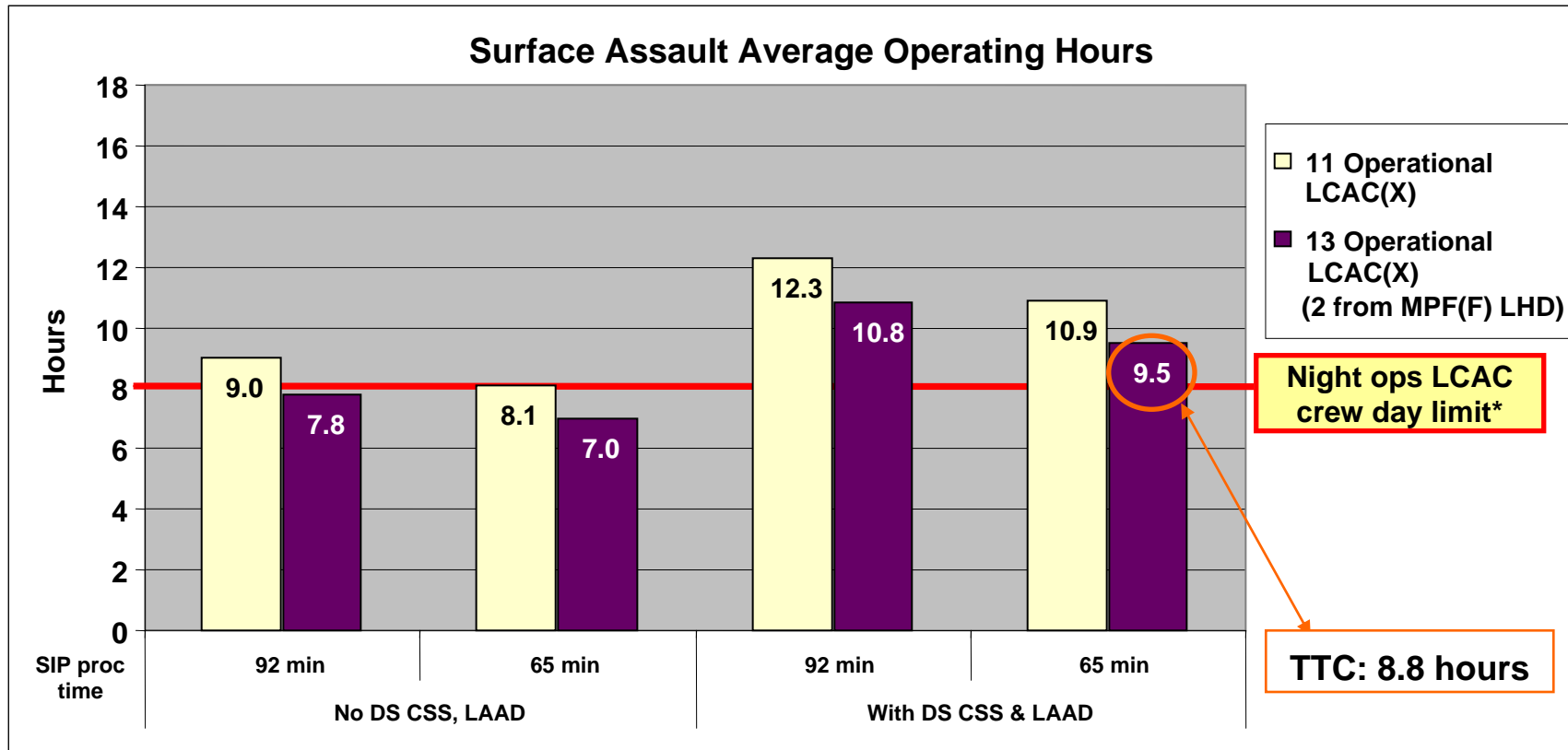
- Improved SIP processing time (without use of LCAC(X) from MPF(F) LHD)

Best case is 8.8 hours, using LCAC(X)s from MPF(F) LHD and improved SIP processing time



# LCAC(X) Results- Average Operating Hours

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**If LCAC(X) night ops crew day is increased to 10 hours, then the average crew day would be under the limit\***

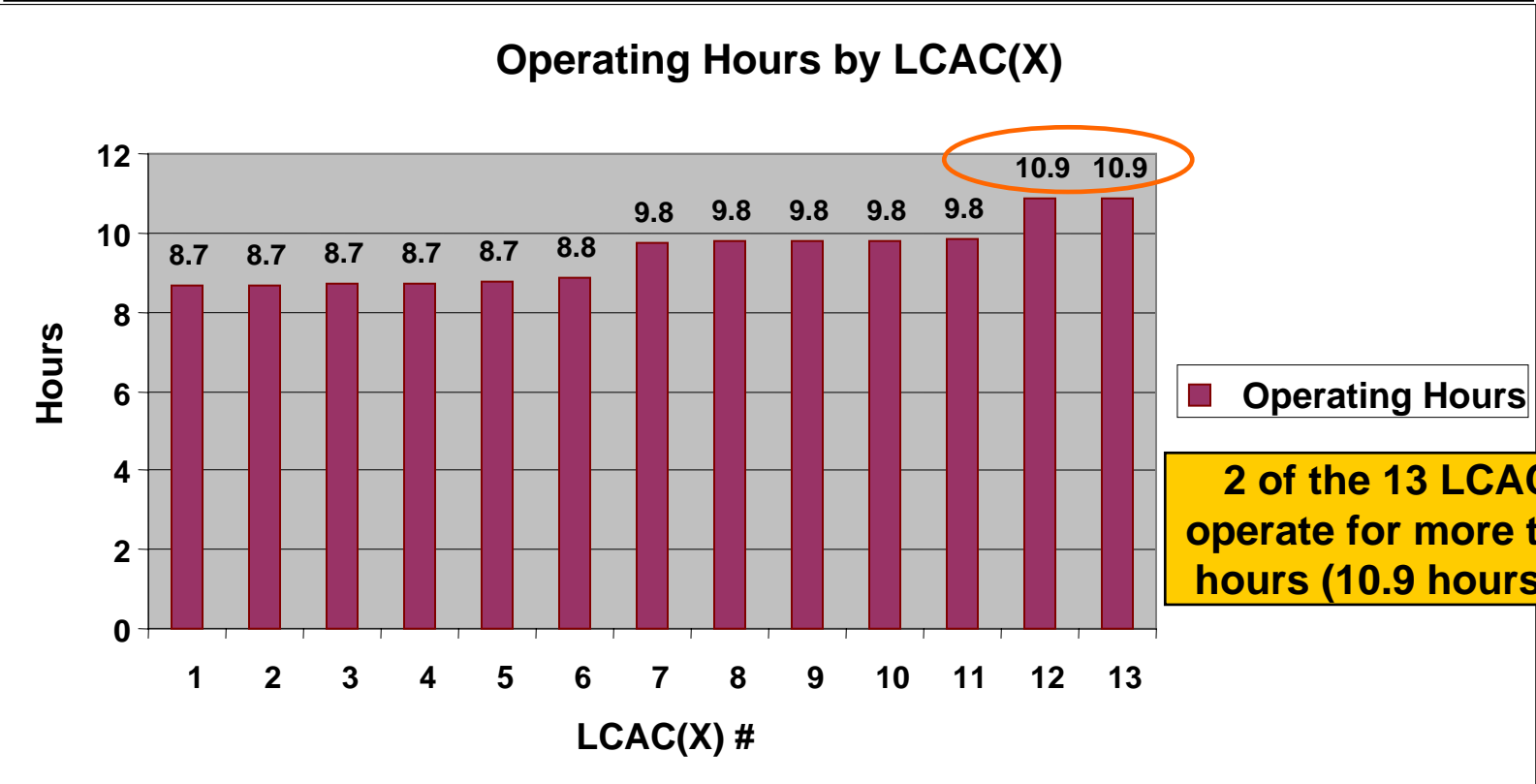
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# Surface Assault Operating Hours by LCAC(X)

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Time-To-Complete: 8.8 hours\*  
Average Operating Hours: 9.5 hours\*  
How many of the 13 operational LCAC(X)s operate for more than 10 hours?



14 Jun 07

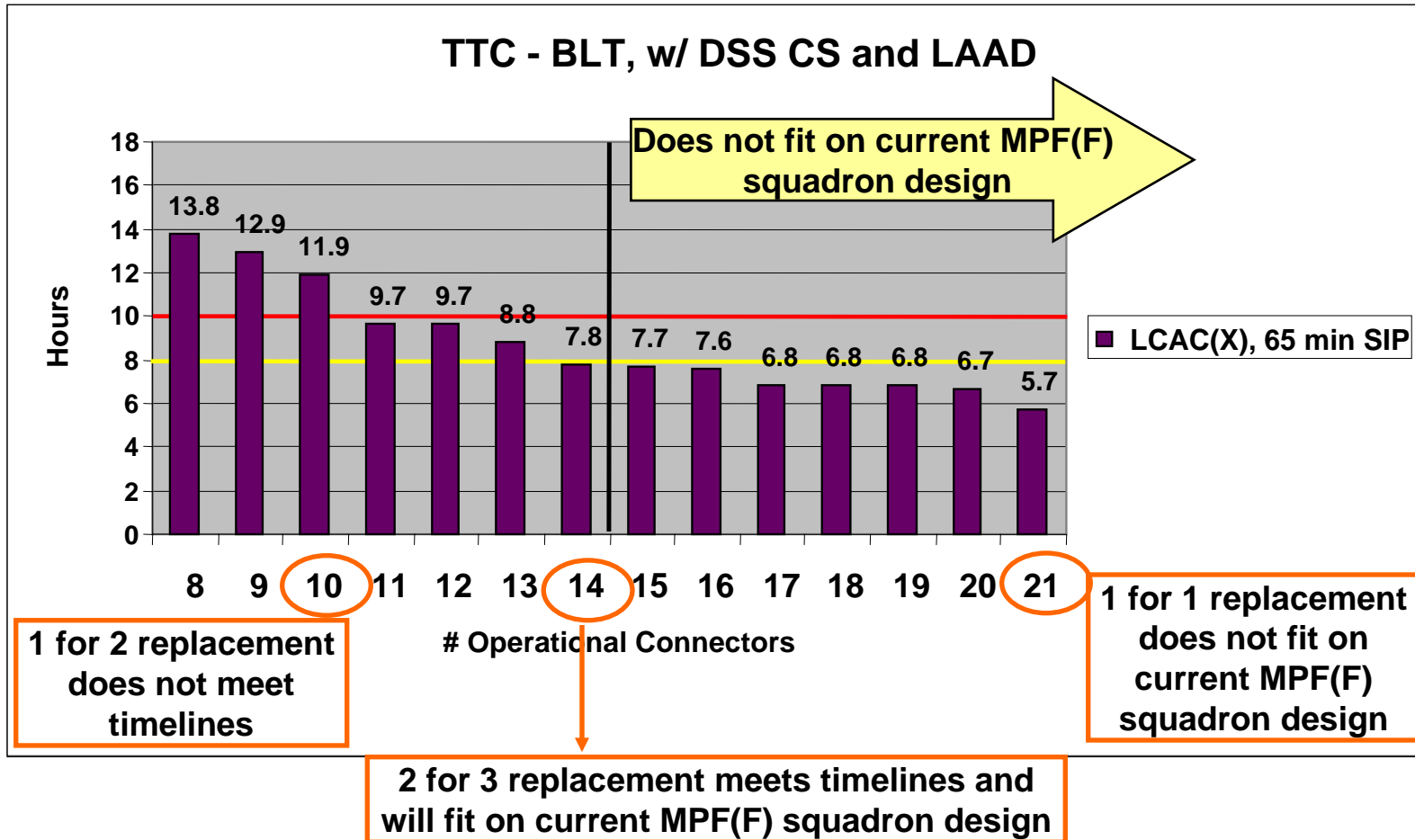
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\*Given surface BLT with DS CSS and LAAD, 13 operational LCAC(X) and SIP processing time of 65 minutes



# Sensitivity Analysis- # Operational Connectors

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# Surface Assault “Take Aways”

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- **Surface Assault w/ LCAC SLEP**
  - **Can meet 8-hour objective for landing surface BLT (w/out DS CSS and LAAD) with**
    - ◆ Improved Surface Interface Point (SIP) processing time
    - AND-
    - ◆ Use of LCACs from MPF(F) LHD
  - **Cannot meet 10-hour threshold for landing surface BLT, DS CSS, and LAAD**
- **Surface Assault w/ Notional LCAC(X)**
  - **Can meet 10-hour threshold for landing surface BLT, DS CSS, and LAAD with**
    - ◆ Improved SIP processing time

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# Agenda



*Mission Area Analysis Branch—Analyzing the Future*

- Background
- Surface Assault
- ✓ **Vertical Assault**
- Ship-to-Objective Sustainment
- The "Take Aways"



# Forces Going Ashore - Vertical

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## ● Units

- 1 – Infantry Battalion
- 1 – EFSS Battery
- 2 – Combat Engineer Platoons
- 1 – DS CSS Company
- 1 – LAAD Det

## ● Personnel/Representative Equipment

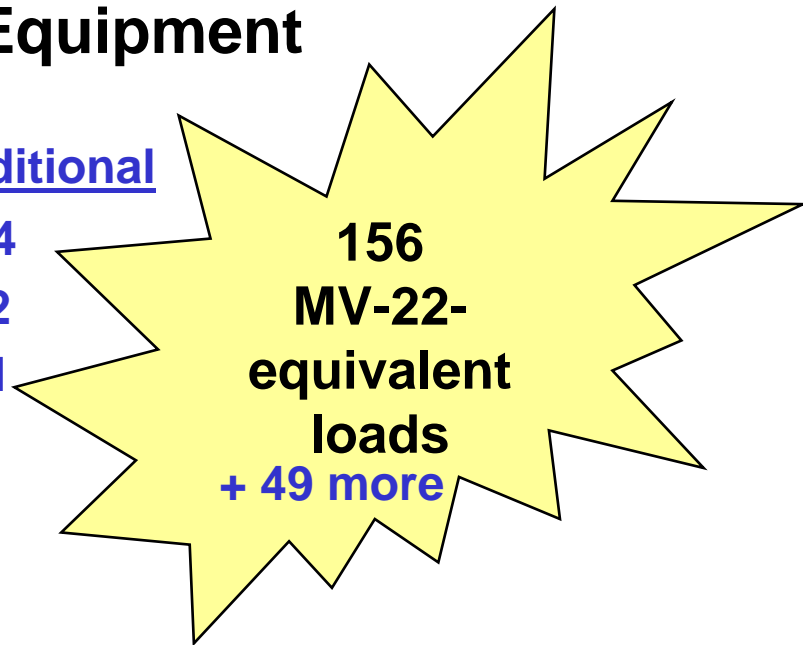
Item	Number
PAX	1,115
HMMWV Wpn Carrier	22
HMMWV Cargo/Comm	67
EFSS	6
ITV	8

+ additional

104

2

31



156

MV-22-

equivalent

loads

+ 49 more

# Vertical Assault Assumptions



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- 110 NM ship-to-objective
- ➔ ● Vertical BLT launched from 2 MPF(F) LHA(R) and 1 MPF(F) LHD
- 124 KIAS for external load speed\*
- 15° C, no wind, LZs at sea level
- ➔ ● Assault support aircraft from MEB ACE in MPF(F) squadron
  - 48 MV-22
  - 20 CH-53K
- Aircraft availability
  - CH-53K MCR: 80% (WG Guidance- DC AVN)
  - MV-22 MCR: 82% (ORD Threshold)
  - 14% (5) MV-22s held out for CASEVAC and other missions (III MEF Planning Factors)
- Without aerial refueling
- ➔ ● No additional armor on vehicles
- ➔ ● 6 Operating Spots per MPF(F) LHA(R) and MPF(F) LHD

\* 124 KIAS is the weighted average of speeds specified in FM10-450 for loads carried in the assault

# *Vertical Assault Excursions*



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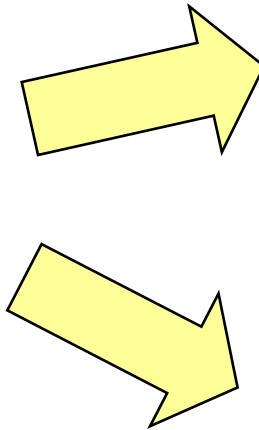
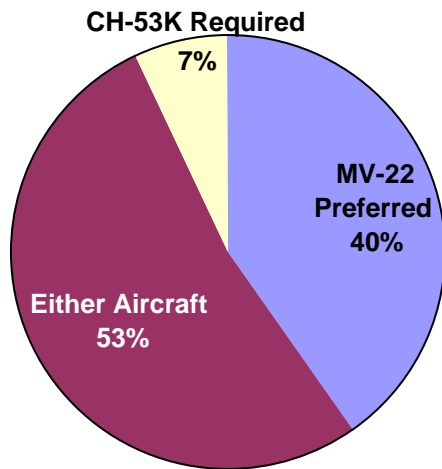
- Land DS CSS and LAAD Det
- Vary temperature from 15° C to 35° C
- Add MAK to HMMWVs
- Vary number of operational deck spots per MPF(F) LHD/MPF(F) LHA(R)



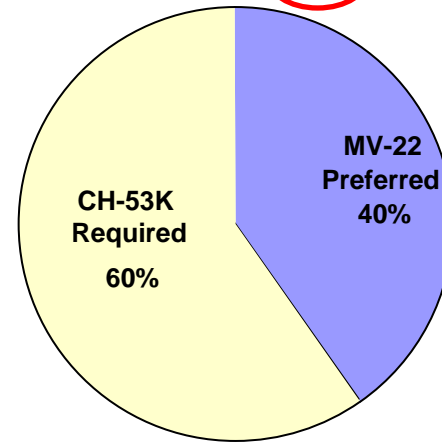
# Impact of Temperature / Armor

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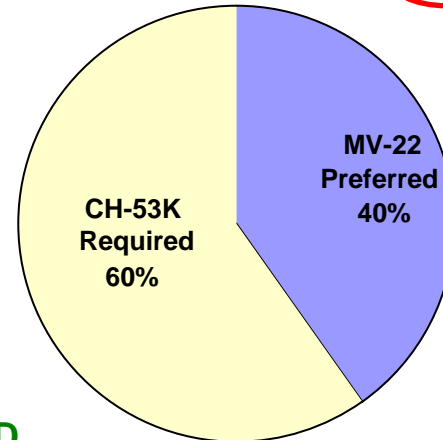
No DS CSS, LAAD, 15° C; No MAK



No DS CSS, LAAD, 35° C; No MAK



No DS CSS, LAAD; 15° C; MAK

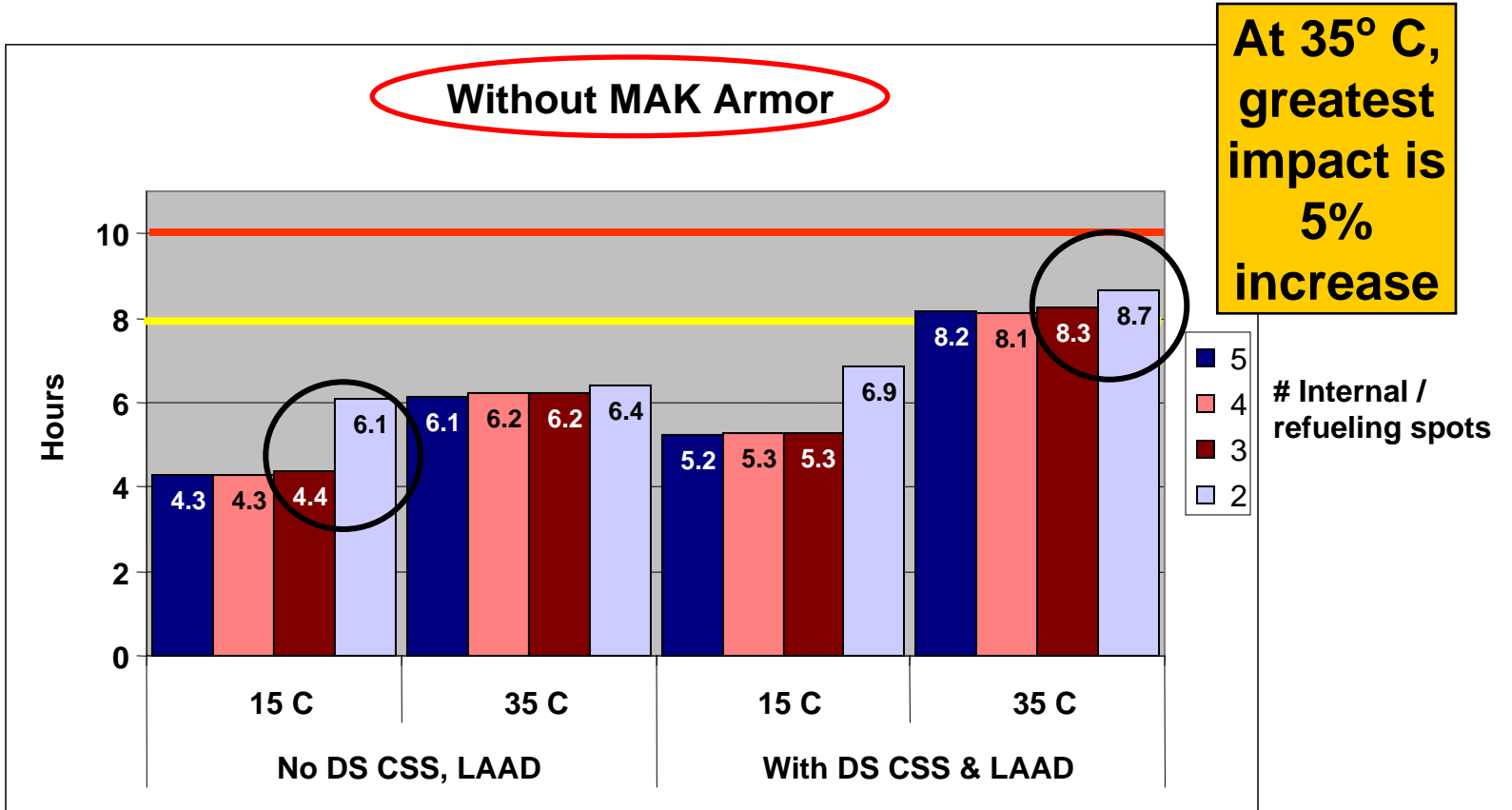


# Vertical STOM Results



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At 15° C, greatest impact is 38% increase



At 35° C, greatest impact is 5% increase

All cases still near or below 8-hour objective

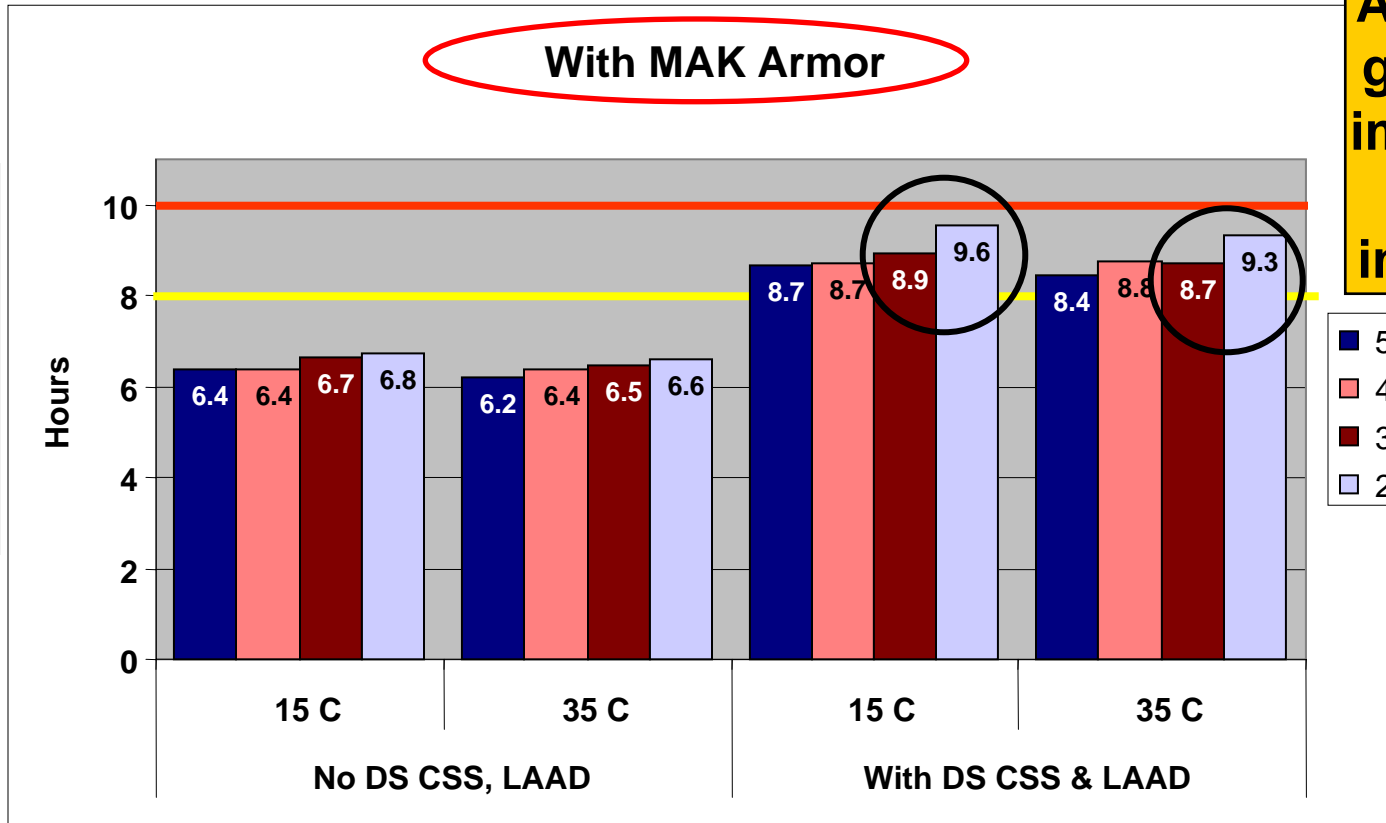
# Vertical STOM Results



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With MAK Armor

At 15° C,  
greatest  
impact is  
8%  
increase

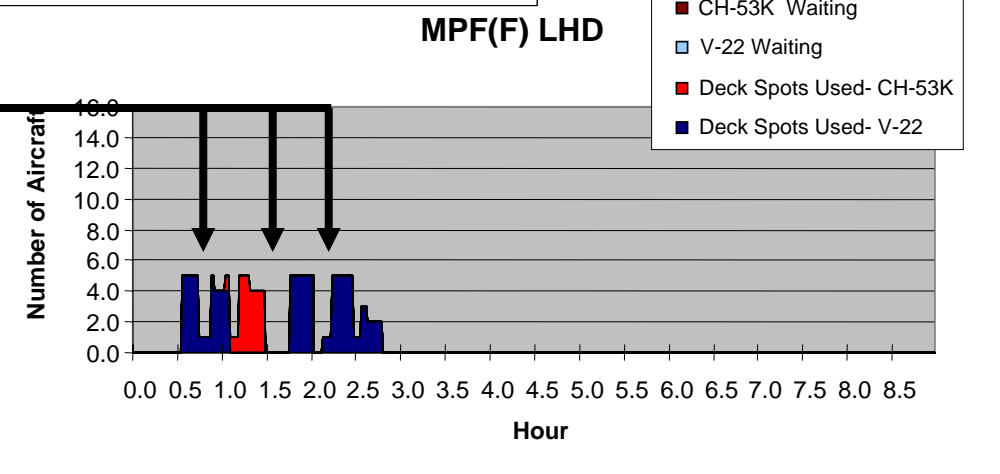
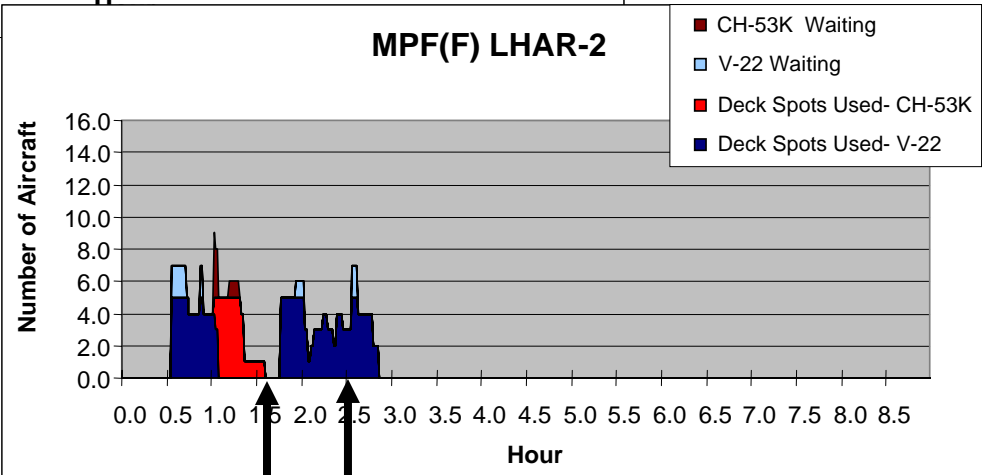
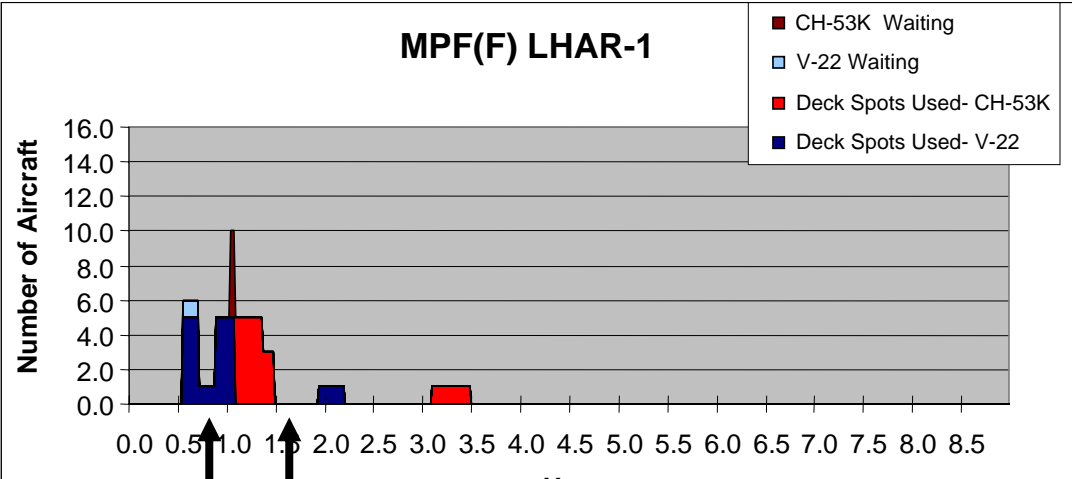


At 35° C,  
greatest  
impact is  
7%  
increase

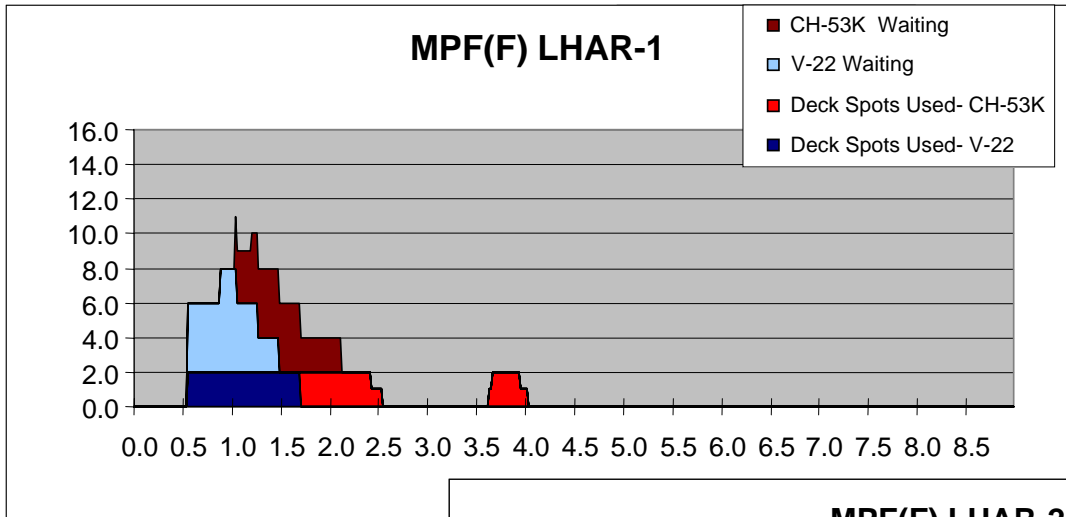
■ 5  
■ 4  
■ 3  
■ 2  
# Internal /  
refueling spots

All cases still below 10-hour threshold

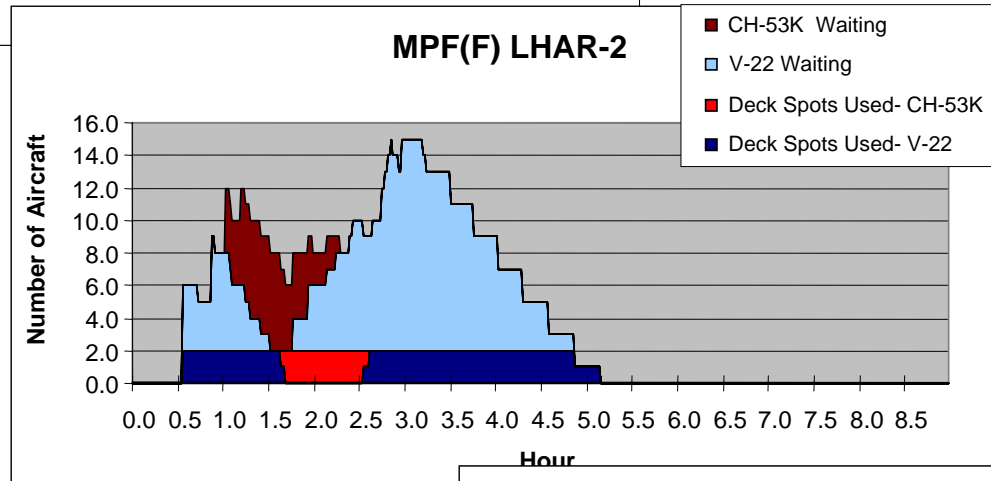
**5 refueling/internal spots**  
**No DS CSS, LAAD**  
**No MAK, 15° C**



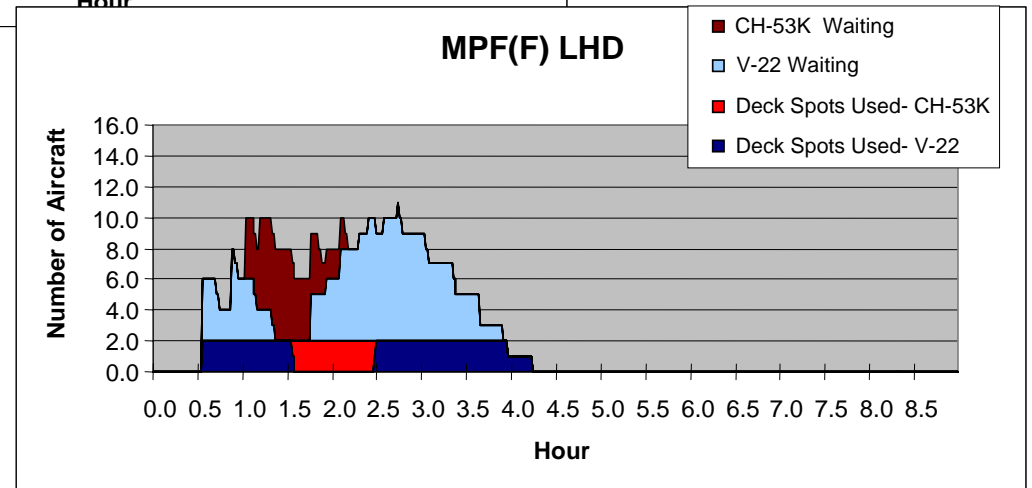
**There are gaps in the activity on the ships**



**2 refueling/internal spots**  
**No DS CSS, LAAD**  
**No MAK, 15° C**



**As the number of operational spots decreases, the gaps can no longer absorb aircraft and the time must shift to the right**





# Vertical Assault “Take Aways”

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## ● Vertical Assault

- Can meet 8-hour objective for landing vertical BLT (w/out DS CSS and LAAD)
  - ◆ With Marine Armor Kit (MAK) armored HMMWV at 35° C
- Can meet 8-hour objective for landing vertical BLT, DS CSS and LAAD
  - ◆ Without MAK armored HMMWV at 15° C
- Can meet 10-hour threshold for landing vertical BLT, DS CSS and LAAD
  - ◆ With MAK armored HMMWV at 35° C

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# Agenda



*Mission Area Analysis Branch—Analyzing the Future*

- Background
- Surface Assault
- Vertical Assault
- ✓ **Ship-to-Objective Sustainment**
- The "Take Aways"



# Ship-to-Objective Sustainment Assumptions

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- ➔ ● Entire Sea Based Maneuver Element (SBME) ashore (3 BLTs, Arty Bn, RLT HQ, DS CSS Bn, etc.)
- Forces go ashore with prescribed load for initial assault
  - BA + 1 DOA (assault rate) for ammo
  - 1 DOS for all other supplies
- Sustainment planning factors
  - Infantry-heavy threat
  - Assault rate of consumption
- All units positioned 110 NM from Sea Base
- ➔ ● Ships providing SBME sustainment vary by class of supply
  - 2 LMSR: Water
  - 2 MPF(F) LHA(R)/MPF(F) LHD: Fuel
  - 2 T-AKE: Dry goods and ammo



## ***Ship-to-Objective Sustainment Assumptions (cont'd)***

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- ➔ ● **Aviation ship operations are staggered in order to provide continuous 24-hr availability of assault support aircraft and flight decks**
- ➔ ● **1-2 aviation ships operating during vertical ship-to-objective sustainment window**
  - **Flight windows are 12 hours**
    - ◆ 10 hours available for actual flying
    - ◆ 2 hours for spotting/re-spotting
- **Aircraft availability**
  - **CH-53K MCR: 80% (WG Guidance- DC AVN)**
  - **MV-22 MCR: 82% (ORD Threshold)**
  - **4 MV-22s held out for CASEVAC and other missions**
- ➔ ● **Assume 2 options for assault support lift coverage**

# Assault Support Lift Coverage- Option 1



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									NIGHT														
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200

MPF(F) LHD available through the period of darkness - 6 MV-22 and 16 CH-53K

MPF(F) LHD - 6 x MV-22 + 16 x CH-53K												
1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	
SPOT	FLIGHT WINDOW 2000 – 0600										RESPOT	

MPF(F) LHA(R) -1 - 18 x MV-22 + 4 x CH-53K										
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
FLIGHT WINDOW										RESPOT

MPF(F) LHA(R)-1 available for 3 hours of the period of darkness - 18 MV-22 and 4 CH-53K

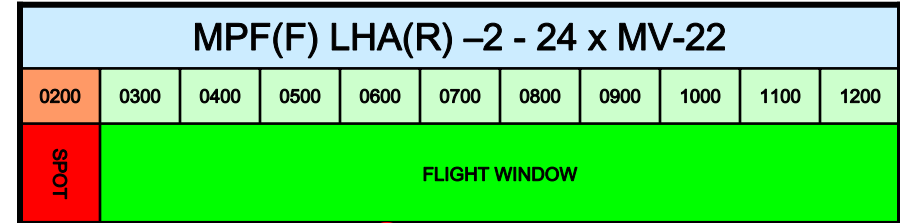
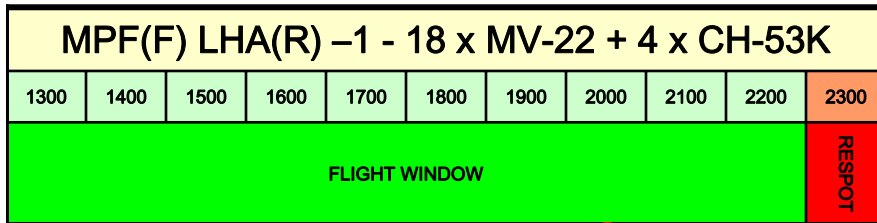
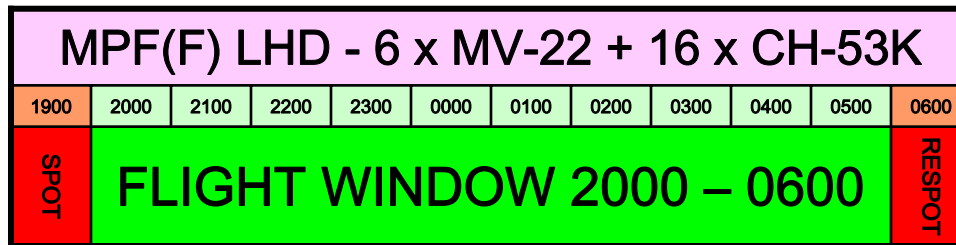
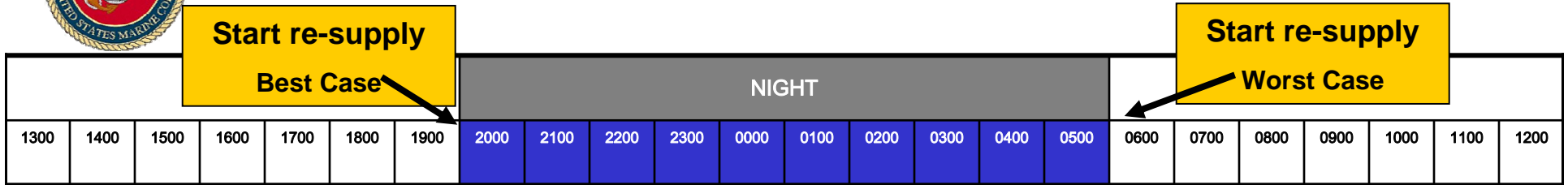
MPF(F) LHA(R) -2 - 24 x MV-22										
0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
SPOT	FLIGHT WINDOW									

MPF(F) LHA(R)-2 available if sustainment time-to-complete exceeds 7 hours- 24 MV-22

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# Assault Support Lift Coverage- Option 1 Best and Worst Case

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AIRCRAFT AVAILABLE FOR SUSTAINMENT PER HOUR MV-22																							
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
18	18	18	18	18	18	18	24	24	24	6	6	6	6	30	30	30	24	24	24	24	24	24	24

AIRCRAFT AVAILABLE FOR SUSTAINMENT PER HOUR CH-53K																							
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
4	4	4	4	4	4	4	20	20	20	16	16	16	16	16	16	16	0	0	0	0	0	0	0

Best case for ship-to-objective sustainment

Worst case for ship-to-objective sustainment

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# Assault Support Lift Coverage- Option 2



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													NIGHT										
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200

MPF(F) LHD available for duration of sustainment window- 12 MV-22 and 12 CH-53K

MPF(F) LHD - 12 x MV-22 + 12 x CH-53K												
1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	
SPOT	FLIGHT WINDOW 2000 – 0600										RESPOT	

MPF(F) LHA(R) -1 - 18 x MV-22 + 4 x CH-53K										
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
FLIGHT WINDOW										RESPOT

MPF(F) LHA(R)-1 available for 3 hours of sustainment window- 18 MV-22 and 4 CH-53K

MPF(F) LHA(R) -2 - 18 x MV-22 + 4 x CH-53K												
0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200		
SPOT	FLIGHT WINDOW											

MPF(F) LHA(R)-2 available if sustainment time-to-complete exceeds 7 hours- 18 MV-22 and 4 CH-53K

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# Assault Support Lift Coverage- Option 2

## Best and Worst Case



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							NIGHT																
							NIGHT																
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200

**Start re-supply**  
Best Case

**Start re-supply**  
Worst Case

MPF(F) LHD - 12 x MV-22 + 12 x CH-53K												
1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	
SPOT	FLIGHT WINDOW 2000 – 0600										RESPOT	

MPF(F) LHA(R) -1 - 18 x MV-22 + 4 x CH-53K										
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
FLIGHT WINDOW										RESPOT

MPF(F) LHA(R) -2 - 18 x MV-22 + 4 x CH-53K										
0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
SPOT	FLIGHT WINDOW									

AIRCRAFT AVAILABLE FOR SUSTAINMENT PER HOUR MV-22																							
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
18	18	18	18	18	18	18	30	30	30	12	12	12	12	30	30	30	18	18	18	18	18	18	18
AIRCRAFT AVAILABLE FOR SUSTAINMENT PER HOUR CH-53K																							
1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
4	4	4	4	4	4	4	16	16	16	12	12	12	12	16	16	16	4	4	4	4	4	4	4

**Best case for ship-to-objective sustainment**

**Worst case for ship-to-objective sustainment**

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# ***Ship-to-Objective Sustainment Updates***

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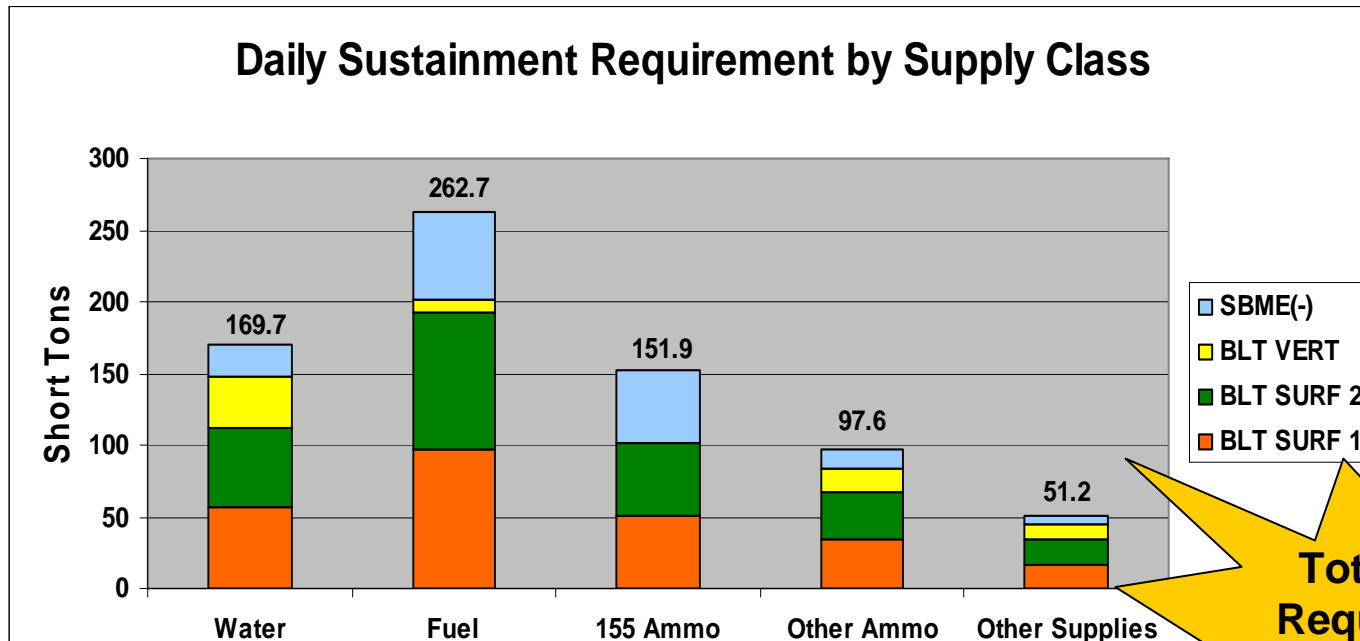
**Sustainment calculations were modified during the course of this analysis due to:**

- **New, emerging containers**
  - **JMIC (Joint Modular Intermodal Container) for dry goods and ammo replaces cargo nets**
  - **GERS (Ground Expedient Refueling System) for fuel replaces other refueling systems**
- **New planning factors for ammunition consumption**
  - **Replacement of MCO-8010.E (1997) with Draft MCO-8010 w/ POM-08 Combat Planning Factors (2006)\***
  - **Includes composite threat**
    - ◆ **Infantry/armor heavy threats no longer used**



# Impact of New Planning Factors for Ammunition

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**Total Daily Requirement 733 short tons**

**% of requirement by weight:**

Water **23%**      Fuel **36%**      155 Ammo **21%**      Other Ammo **13%**      Other Supplies **7%**

**Impact of new planning factors (in short tons)**

**+ 108.4**      **+ 36.3**

**Due to changes in ammo requirements, the daily sustainment requirement of the SBME has increased from 583 to 733 short tons - a 26% increase**



# Impact of New, Emerging Containers

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**Concept: Vertical resupply via external lift. Loads configured for MV-22, with CH-53Ks lifting three loads.**

**MV-22 Equivalent loads are defined as ...**

## 155 Ammo

- 4 x JMIC (8,375 lbs)
- cube out before max weight
- Use of JMIC: decrease of 800 lbs of ammo per load compared to cargo nets

## Other Ammo

- 4 x JMIC (8,447 lbs)
- cube out before max weight
- Use of JMIC: decrease of 2,126 lbs of ammo per load compared to cargo nets

## Other Supplies

- 8 x JMIC (6,519 lbs)
- cube out before max weight
- Use of JMIC: decrease of 1,825 lbs of supplies per load compared to cargo nets

## Fuel

- 1 x 10K Cargo Net with 6 155 gal GERS (7,585 lbs) at LZs w/ trucks
- Use of 155 gal GERS: decrease of 1,836 lbs of fuel per load compared to 300 gal EFS
- 2 x 10K Cargo Net with 36 28 gal GERS (9,201 lbs) at LZs w/o trucks
- Use of 28 gal GERS: no change

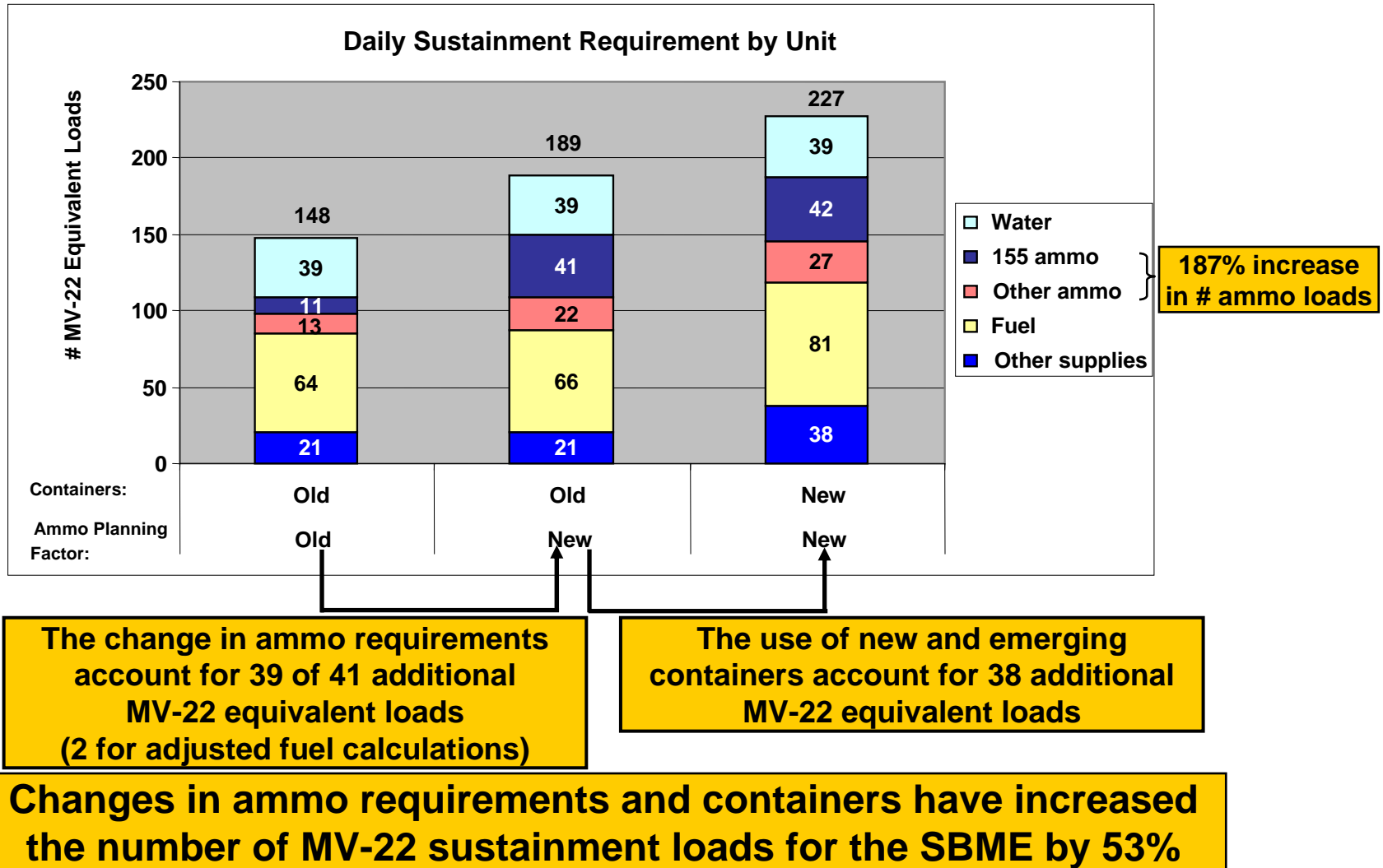
## Water

- 2 x 500 gal drum (8,967 lbs)

# Impact of New Ammo Planning Factors and Packaging



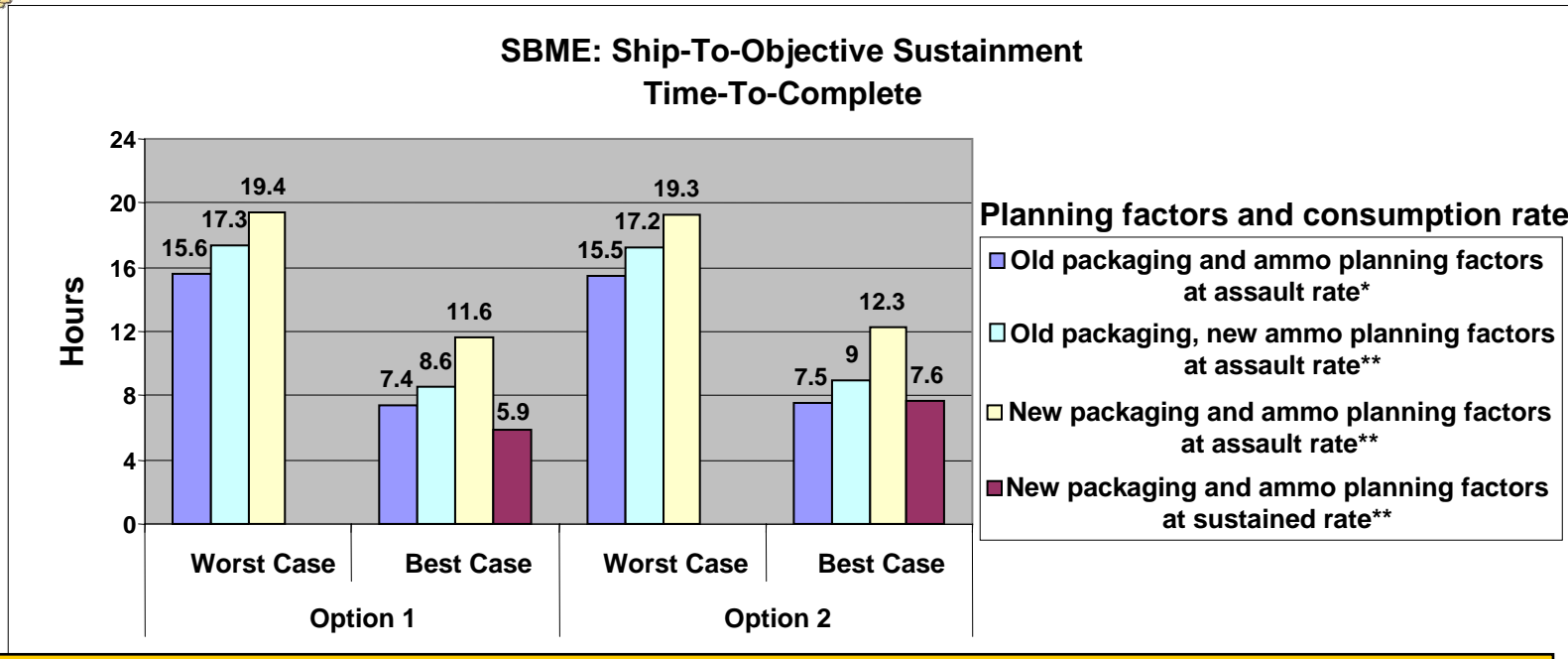
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# Ship-To-Objective Sustainment Results



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**Changes in ammo requirements and containers have pushed assault-rate sustainment of the SBME beyond a period of darkness**

**SBME can be re-supplied at sustained rate in a period of darkness**

Source of sustainment:

- 2 LMSR – Water;
  - 1-2 MPF(F) LHA(R)/MPF(F) LHD – Fuel;
  - 2 T-AKE – Dry goods
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\* Old ammo planning factors: MCO-8010.E (1997): 583 total short tons of sustainment (assault rate/ infantry-heavy)

\*\* New ammo planning factors: Draft MCO-8010 (2006):  
733 total short tons of sustainment (assault rate/ composite);  
470 total short tons of sustainment (sustained rate/composite)



# ***Ship-to-Objective Sustainment “Take Aways”***

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## ● **Vertical ship-to-objective sustainment**

- **Impact of changes in MCO-8010 and packaging containers:**
  - ◆ **53% increase in number of MV-22 equivalent loads required to sustain SBME**
  - ◆ **Time to sustain the entire SBME at assault rate extends beyond a period of darkness**
  - ◆ **SBME can be re-supplied at sustained rate in a period of darkness**
- **Schedule mission during period that maximizes assault support capabilities**
  - ◆ **CH-53K is critical for delivery of sustainment ashore**

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# Agenda



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- Overall Assumptions
- Surface Assault
- Vertical Assault
- Ship-to-Objective Sustainment
- ✓ The “Take Aways”

# The “Take Aways”



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- **Surface Assault w/ LCAC SLEP**
  - **Can meet 8-hour objective for landing surface BLT (w/out DS CSS and LAAD) with**
    - ◆ Improved Surface Interface Point (SIP) processing time
    - AND-
    - ◆ Use of LCACs from MPF(F) LHD
  - **Cannot meet 10-hour threshold for landing surface BLT, DS CSS, and LAAD**
- **Surface Assault w/ Notional LCAC(X)**
  - **Can meet 10-hour threshold for landing surface BLT, DS CSS, and LAAD with**
    - ◆ Improved SIP processing time

# The “Take Aways” (cont’d)



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## ● Vertical Assault

- Can meet 8-hour objective for landing vertical BLT (w/out DS CSS and LAAD)
  - ◆ With Marine Armor Kit (MAK) armored HMMWV at 35° C
- Can meet 8-hour objective for landing vertical BLT, DS CSS and LAAD
  - ◆ Without MAK armored HMMWV at 15° C
- Can meet 10-hour threshold for landing vertical BLT, DS CSS and LAAD
  - ◆ With MAK armored HMMWV at 35° C

# The “Take Aways” (cont’d)



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## ● Vertical ship-to-objective sustainment

- Impact of changes in MCO-8010 and packaging containers:
  - ◆ 53% increase in number of MV-22 equivalent loads required to sustain SBME
  - ◆ Time to sustain the entire SBME at assault rate extends beyond a period of darkness
  - ◆ SBME can be re-supplied at sustained rate in a period of darkness
- Schedule mission during period that maximizes assault support capabilities
  - ◆ CH-53K is critical for delivery of sustainment ashore

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# Questions?

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