



MTVR Trailer COA Analysis

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Purpose

Mission Area Analysis Branch—Analyzing the Future

- **Analyze four courses of action (COAs) regarding MTRV trailers :**
 - COAs defined by LID
 - Provide number of MTRVs and trailers required for each COA
 - Develop and evaluate measures of effectiveness
 - Identify potential “best” COA/COAs
 - Conduct excursions for Sixcon and Quadcon containers

- **Alternatives are MTRVs with the following trailers:**
 - COA 1 – Legacy specialized trailers (M105, M149, M353)
 - COA 2 - MTRV specialized trailers (MK versions, non modular)
 - COA 3 - New technology specialized trailers (cargo, water, generators)
 - COA 4 - New technology modular trailers (no specialized variants)



Legacy Specialized Trailers

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M105

- Date entered service 1 Jun 1963
- Vehicle Curb Weight* 2,694 lbs
- Cross Country Payload 3,000 lbs of cargo



M149

- Date entered service 1982
- Vehicle Curb Weight* 2,900 lbs
- Cross Country Payload 400 gallons of water



M353

- Date entered service 1 Jul 1976
- Vehicle Curb Weight* 2,650 lbs
- Cross Country Payload 7,000 lbs – 1 generator

Designed to be towed by 2 ½ and 5-ton trucks

*** Weight includes armor kit**

MTVR Specialized Trailers

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MK105



- Vehicle Curb Weight* 10,600 lbs
- Cross Country Payload 8,000 lbs of cargo

MK149



- Vehicle Curb Weight* 10,773 lbs
- Cross Country Payload 600 gallons of water

MK353



- Vehicle Curb Weight* 10,705 lbs
- Cross Country Payload 8,000 lbs
- Carries 2 generators (30 or 60 kw or combo)

MTVR Trailers – limited number fielded before production halted

* Weight includes armor kit

New Technology Trailer



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- **Lighter curb weight (10,000 lbs) with increased cross country payload (12,000 lbs)**
- **Designed for MTRV**
- **Water variant capacity – 800 gallons**
- **Generator variant capacity – 2 generators**
- **Could design as modular trailer to combine compatible cargo types (e.g. water + MREs, generators + dry cargo) rather than fielding specialized variants (generator, water bull)**

Should new trailer designs be specialized or modular?



Agenda

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✓ Methodology

- Study Issues
- Data and Assumptions
- Scenarios
- Resupply Requirements
- Measures of Effectiveness

● Results MTRV Trailer COA Analysis

- MTRVs and Trailers
- Crew
- Vehicle Square
- Fuel Consumed
- Curb Weight
- Excursions
- Findings
- Take Aways

Study Issues



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- **Can the transportation efficiency be improved by fielding a new family of MTRV trailers?**
- **What are the measures of effectiveness to evaluate the proposed COAs?**
- **Which COAS are “best”?**
- **Would developing a modular MTRV trailer improve MEB embarkation?**



Data

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- **Use existing 2024 MEB* and MPF MEB** data:**
 - **Equipment Density List (EDL) and # of personnel with small arms added**
 - **Supply requirements based on selected Planning Factors**

- **Scenarios:**
 - 1) **DS CLC mobile loads 1 DOS for Surface BLT conducting amphib assault**

 - 2) **MEB tactical Hqtrs moves from port to tactical assembly area following MPF offload**

*** 2024 MEB for ASR CBA 2009 provided by SID on 9/16/2010**

**** MPF MEB for MCA-18 provided by SID on 01/17/2013,
personnel from MCBUL 3501 Apr 14, 2010**



Supply Assumptions

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- **Class 3, fuel consumption:**
 - Vehicle numbers and type as identified in EDL
 - Gallons per hour consumed for each as identified TM 11240-ODA
 - Vehicles operate 12 hours per day
- **Class 5, ammunition:**
 - Weapons by type as identified in EDL
 - Composite threat at assault rate planning factor from MCO 8010. 1E (POM-10) by DODIC
- **Other Supplies: (from MAGTF Planner's Manual Feb 09)**
 - Class 1 – Water (7 gallons @ 8.337 lbs per) = 58.36 lbs per Marine per day
 - Class 1 – Rations (3 @ 1.86 lbs per) = 5.58 lbs per Marine per day
 - Class 2 – 2.09 lbs per Marine per day
 - Class 4 – 3.80 lbs per Marine per day
 - Class 6 – 3.40 lbs per Marine per day
 - Class 8 – 1.47 lbs per Marine per day
 - Class 9 – 2.50 lbs per Marine per day
- **Batteries: Software Power Version 1.3, US Army CECOM LCMC 10/03/08**
 - Batteries – 5.42 lbs per Marine per day

Container Assumptions

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- **Available containers to transport fuel include:**
 - **Sixcon capacity 900 gallons**
 - **Medium Ground Expedient Refueling System (GERS) capacity 155 gallons or 155 gallon GERS (4x155) POD boxes**
 - **Small GERS capacity 28 gallons or 28 gallon GERS (6x28) POD boxes**

- **Water transported in the following containers:**
 - **Sixcon capacity 887 gallons**
 - **Standard pallets of 18oz water bottles, 121.5 gallons per pallet**
 - **Standard pallets of five gallon water cans, 105 gallons per pallet**

Container Assumptions (contd)

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- **Class 1 rations, all palletized MREs, 576 meals per pallet**
- **Quadcon used for an excursion, loaded with other supplies only:**
 - Empty weight 2468 pounds
 - Capacity 7532 pounds of cargo
- **All other supplies transported in JMICS:**
 - Capacity with 155 Ammo 1,794 lbs
 - Capacity with Other Ammo 1,812 lbs
 - Capacity with all other supplies 515 lbs (cubes out before weighs out)
 - Empty weight 327 lbs
- **Can't load water or MREs on the same trailer with fuel**

Vehicle and Trailer Data



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<u>Description</u>	<u>Curb Weight (lbs) No armor kit</u>	<u>Off Road Cargo Capacity (lbs)</u>	<u>Vehicle Square (ft²)</u>	<u>Fuel Consumption (GPH)</u>
MTVR*	36,700	13,400	214.3	14.95
Legacy Trailer M105 (cargo)	2,670	3,000	96.3	NA
Legacy M149 (400 gallon water)	2,800	3,335	90.1	NA
Legacy M353 (generators)	2,720	7,000	124.9	NA
MTVR Trailer MK105 (cargo)	11,500	8,000	133.4	NA
MTVR MK149 (600 gallon water)	12,000	5,000	135.6	NA
MTVR MK353 (generators)	11,300	8,000	133.4	NA
New Tech (800 gallon water)	10,000	6,700	134.8	NA
New Tech (2 generators)	10,000	8,100	134.8	NA
New Tech Modular Trailer	10,000	12,000	134.8	NA

*Three man crew; driver, a-driver, gunner from LID 3/1/2011

Amphib MEB, Combat Logistics Company



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- **Surf BLT 1 from 2024 MEB, (ASR CBA – 2009)**
- **Combat Logistics Company DS to Surface BLT**
- **DS CLC contains:**
 - **LVSRs**
 - **MTVRs**
 - **MTVR Trailers**
 - **Personnel**

**Determine number of vehicles in DS CLC to mobile load 1 DOS
for Surf BLT**

MPF MEB, Tactical Hqtrs



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MPF MEB offloads at port and then a “tactical headquarters” element redeploys 80 miles to tactical assembly area

- **Created a notional “tactical” MEB headquarters element**
 - Personnel-223
 - Generators: 6-30kw B0953, and 5-60kw B1021
 - Motor Transport: MTRVs and trailers

Determine number of vehicles in notional MEB Hqtrs to mobile load 11 generators plus 1 DOS



Resupply Requirements (lbs)

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One Day of Supply (DOS) at Assault Rate for Composite Threat

<u>Class of Supply</u>	<u>Amphib MEB Surf BLT</u>	<u>MPF MEB Tactical HQTRS</u>
Class 1 - Water	107,264	13,014
Class 1 - Rations	10,256	1,244
Class 2 – Individ. Equip, Clothing	3,843	466
Class 3 – POL, Fuel	222,620	74,995
Class 4 – Construction Materials	6,984	847
Class 5 – Ammunition	60,406	537
Class 6 – Personal Demand Items	6,249	758
Class 7 – Major End Items	NA	NA
Class 8 – Medical (AMALS/ADALS)	2,702	328
Class 9 – Repair Parts	4,595	558
Class 10 – Non-military	NA	NA
Batteries	9,956	1,208
Total All Classes (lbs)	434,875	93,955



Measures of Effectiveness (MOEs)

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Calculate following MOEs for each scenario:

- **Total MTRVs and Trailers**
- **Number of Crew (Drivers/A-Drivers/Gunners)**
- **Total Vehicle Square (ft²)**
- **Total Fuel Consumed (gallons)**
- **Total Curb Weight MTRVs and Trailers (tons)**



Agenda

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- Measures of Effectiveness

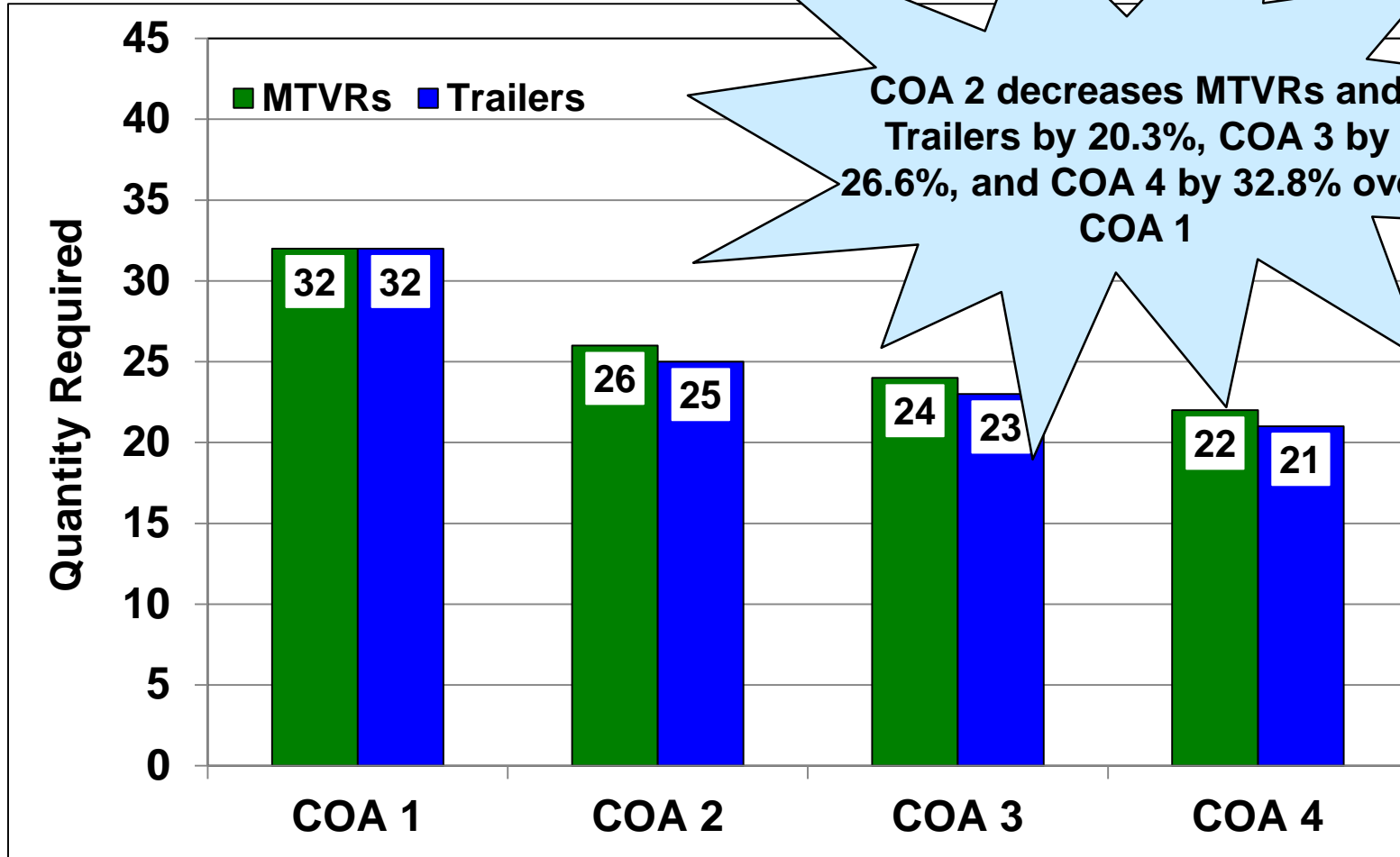
✓ Results MTRV Trailer COA Analysis

- MTRVs and Trailers
- Crew
- Vehicle Square
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Findings: Amphib MEB DS CLC MTVRs and Trailers



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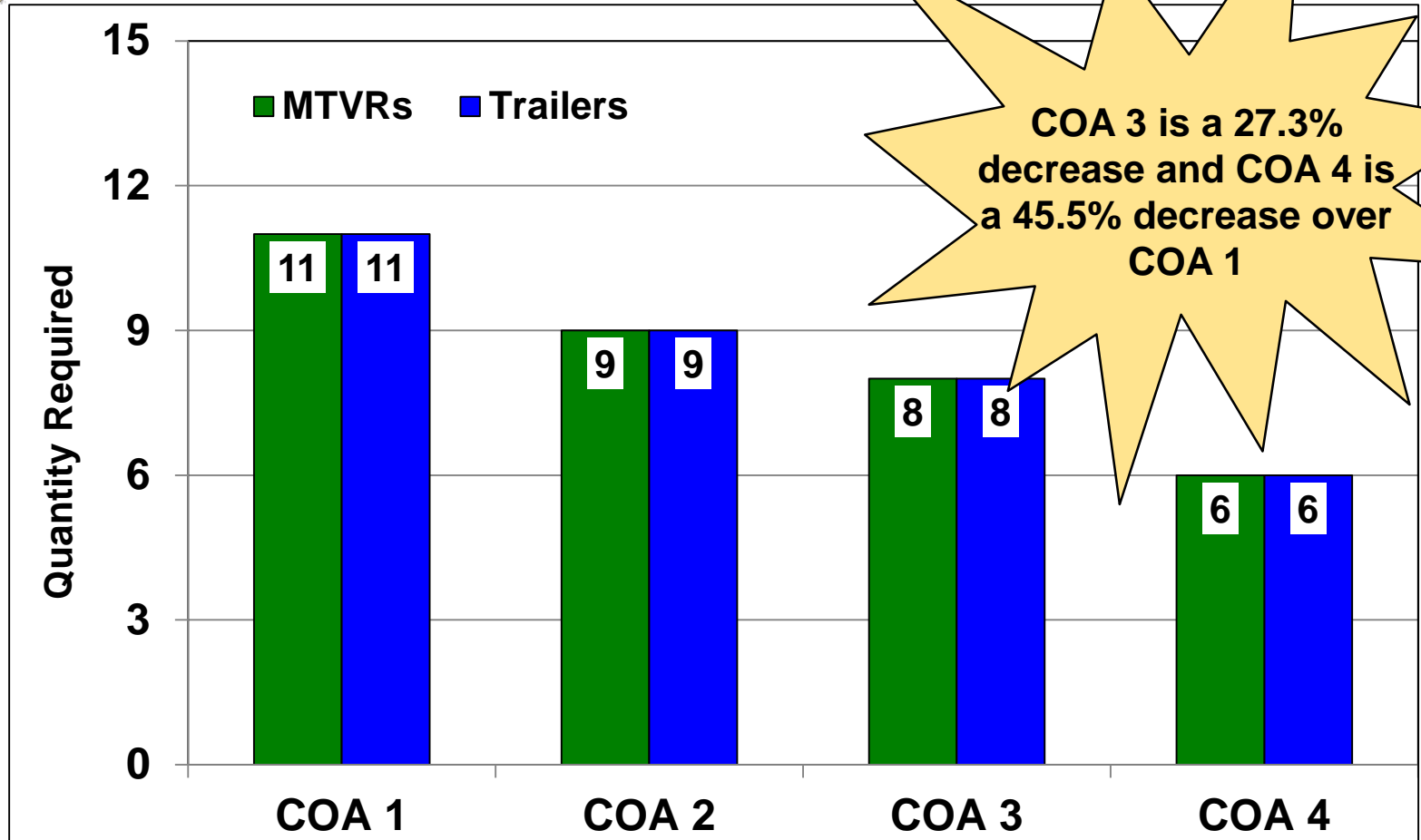


Modular trailers (COA 4) is most efficient for DS CLC supporting SURF BLT

Findings: MPF MEB Tactical Headquarters MTVRs and Trailers



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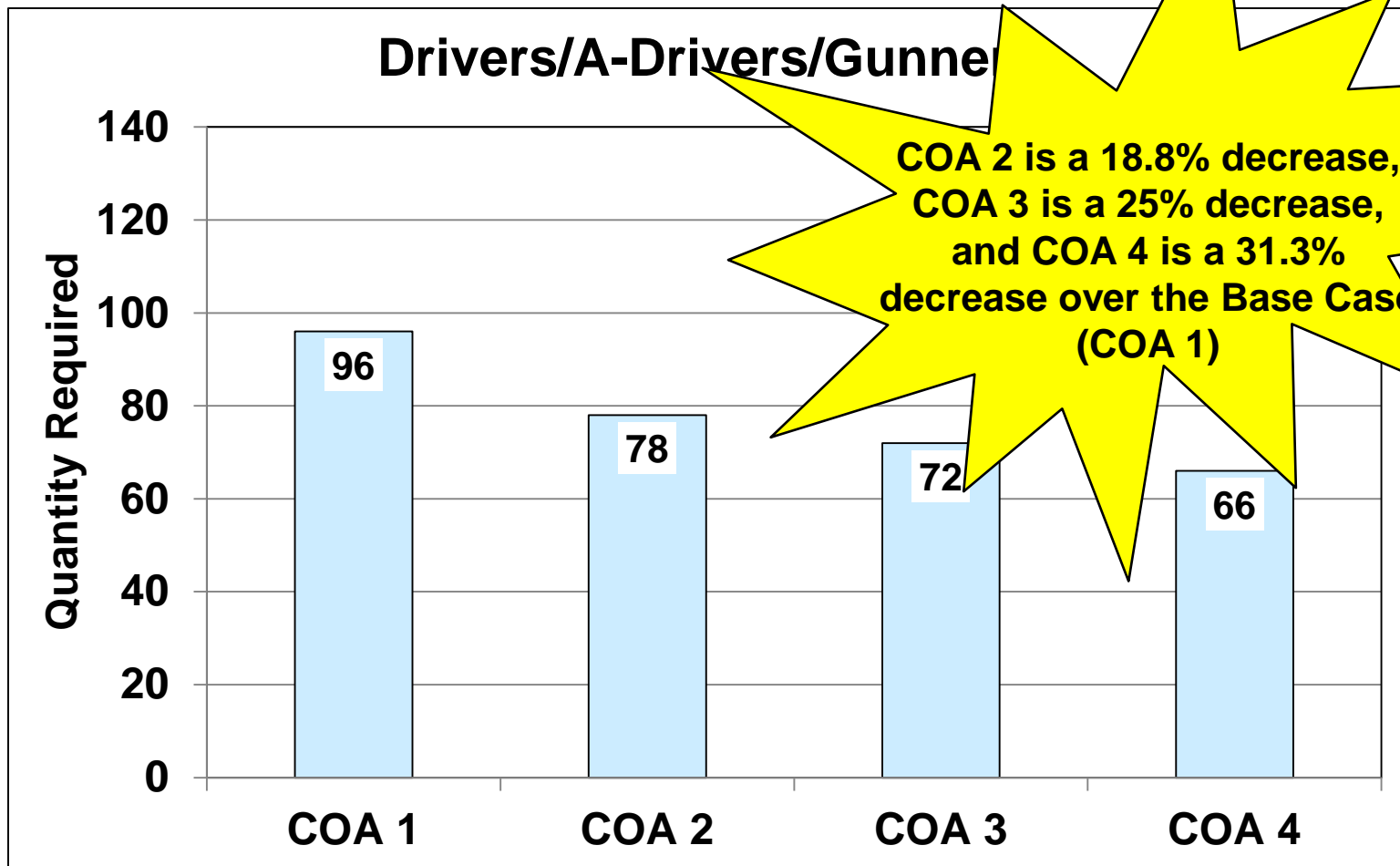


Specialized generator trailers that only transport one generator are inefficient

Findings: Amphib MEB DS CLC Drivers/A-Drivers/Gunners



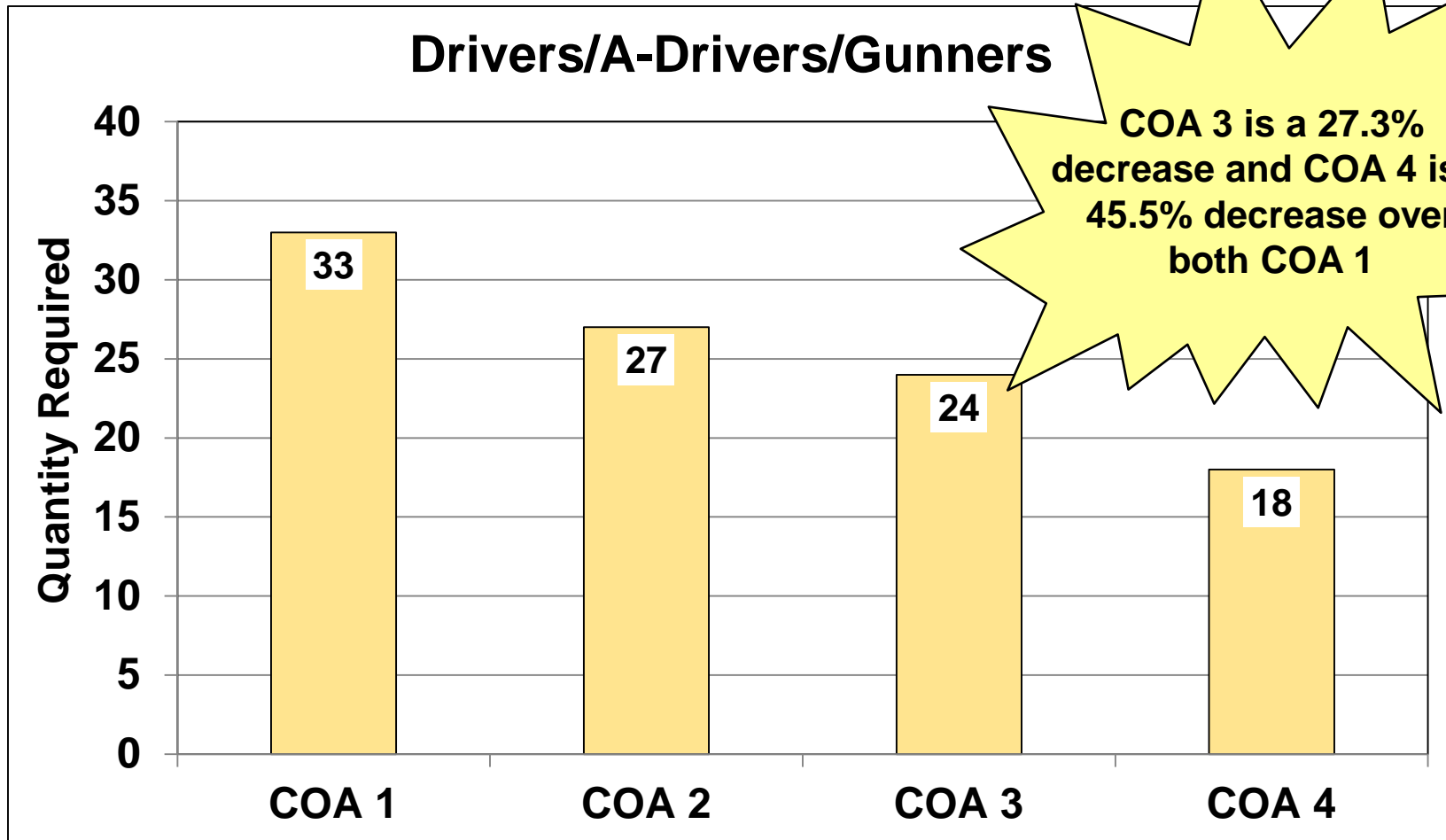
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Findings: MPF MEB Tactical Hqtrs Drivers/A-Drivers/Gunners



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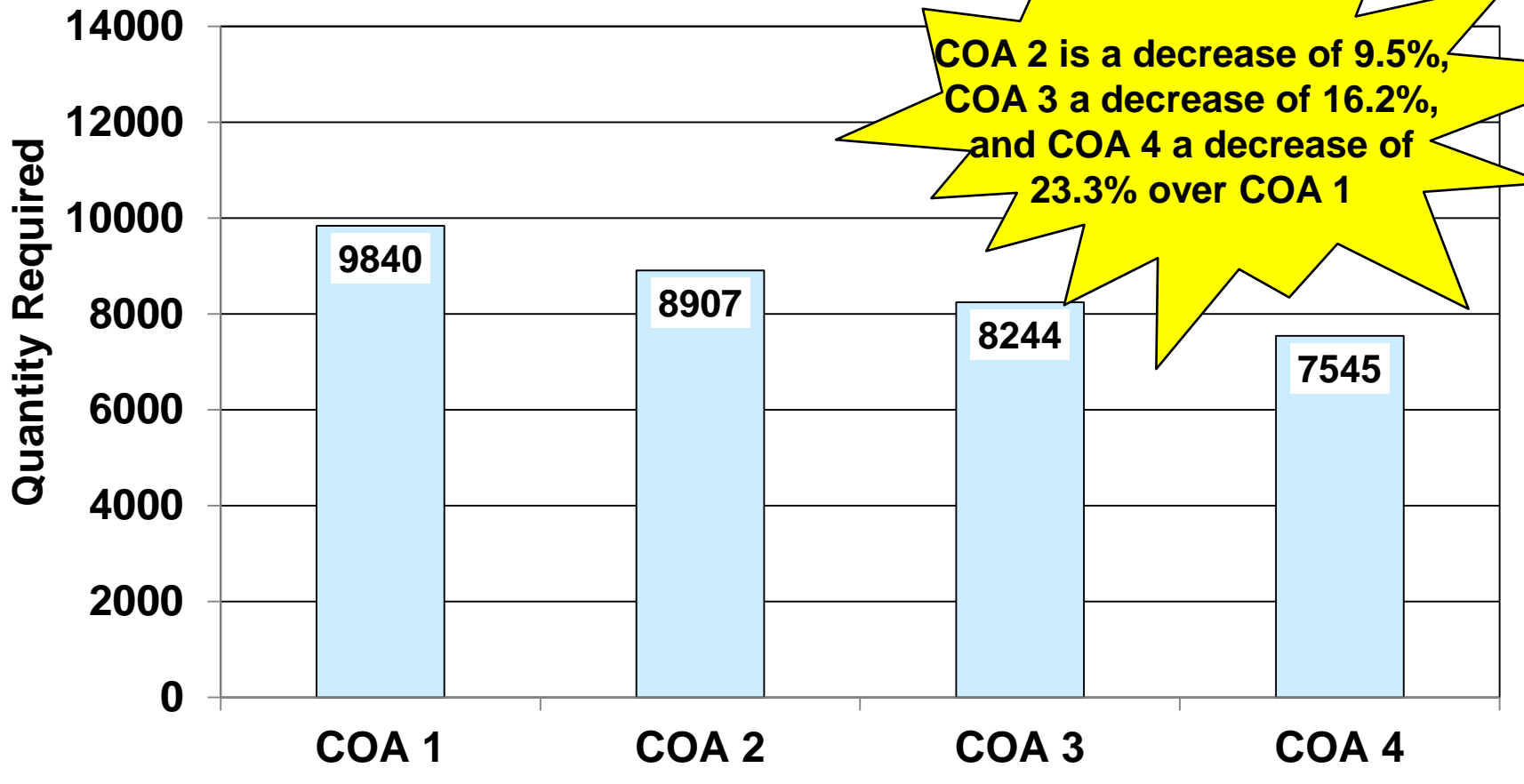


Findings: Amphib MEB DS CLC Total Vehicle Square (ft²)



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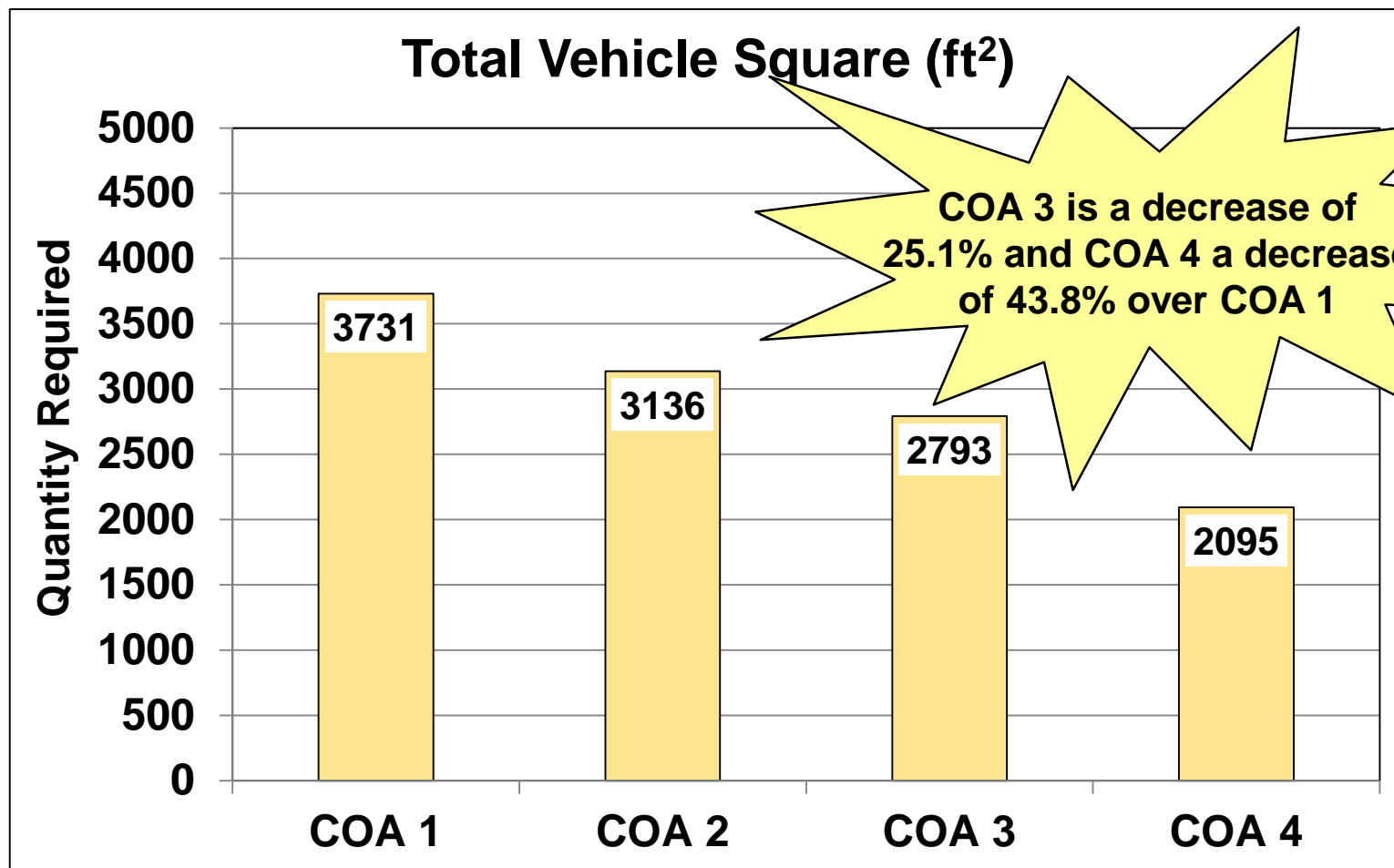
Total Vehicle Square (ft²)



Findings: MPF MEB Tactical Hqtrs Total Vehicle Square (ft²)



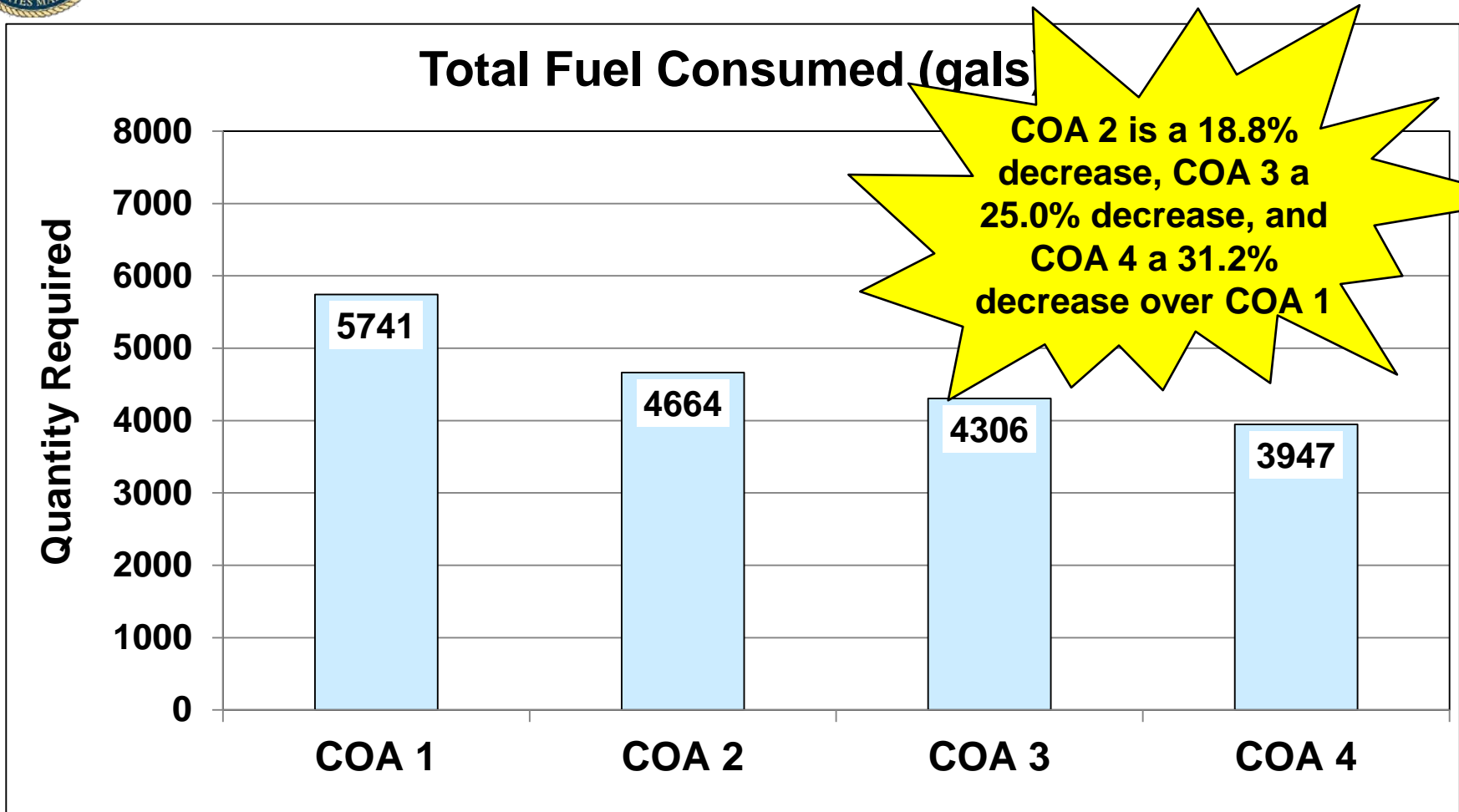
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Findings: Amphib MEB DS CLC Total Fuel Consumed (gals)*



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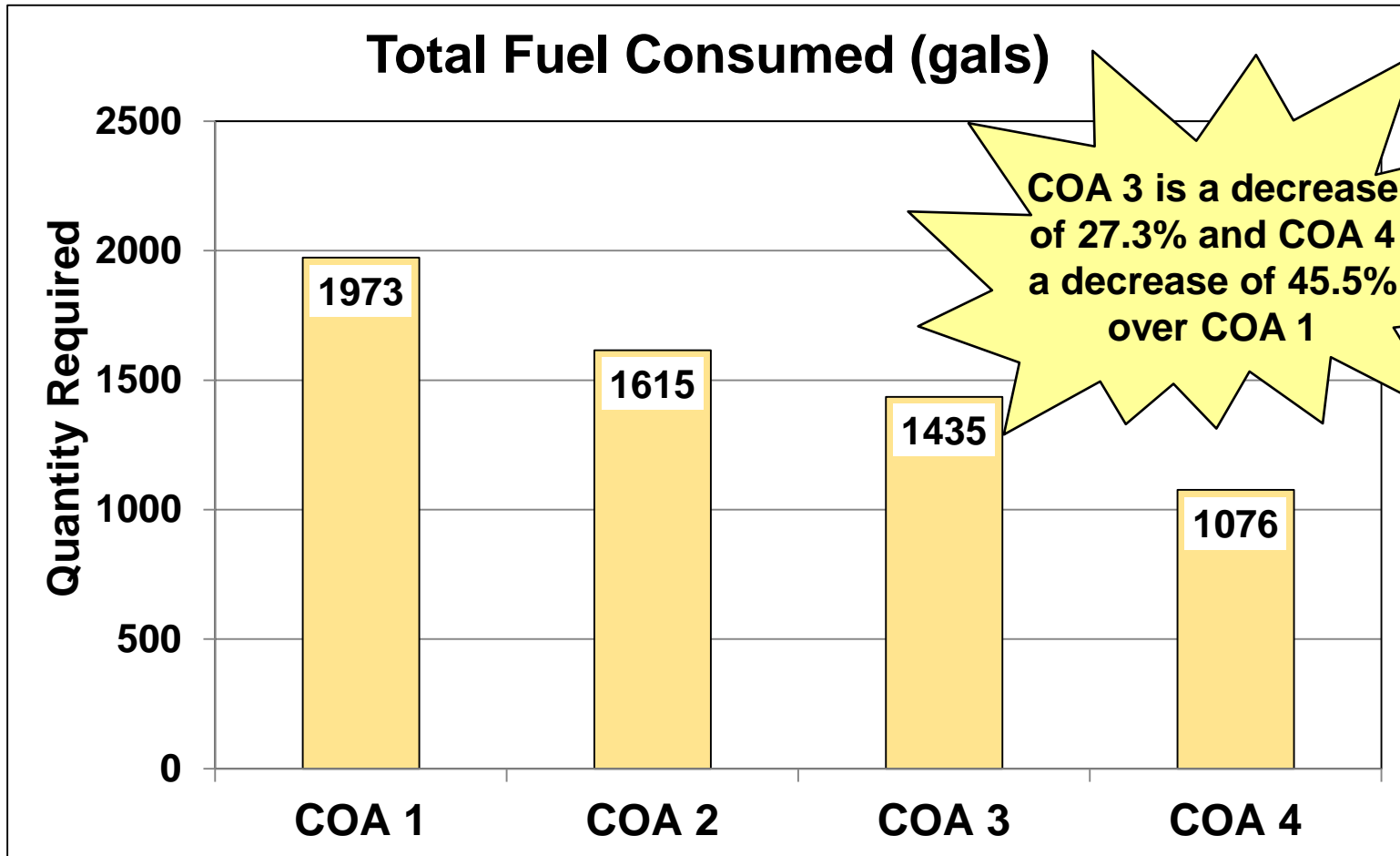


*Assume 12 hours of operation

Findings: MPF MEB Tactical Hqtrs Total Fuel Consumed (gals)*



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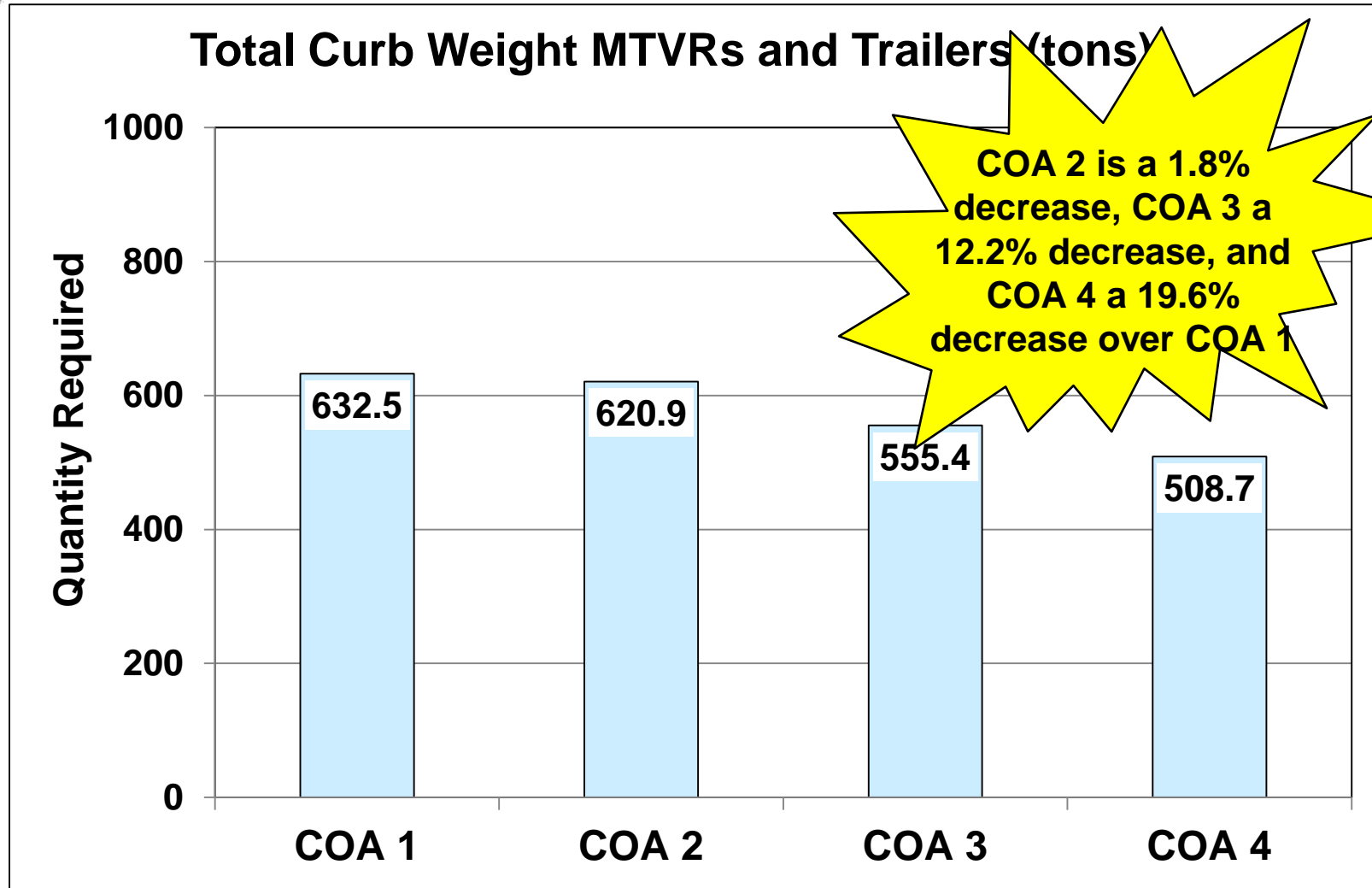
* Assume 12 hours of operation

Findings: Amphib MEB DS CLC

Curb Weight MTRVs and Trailers (tons)



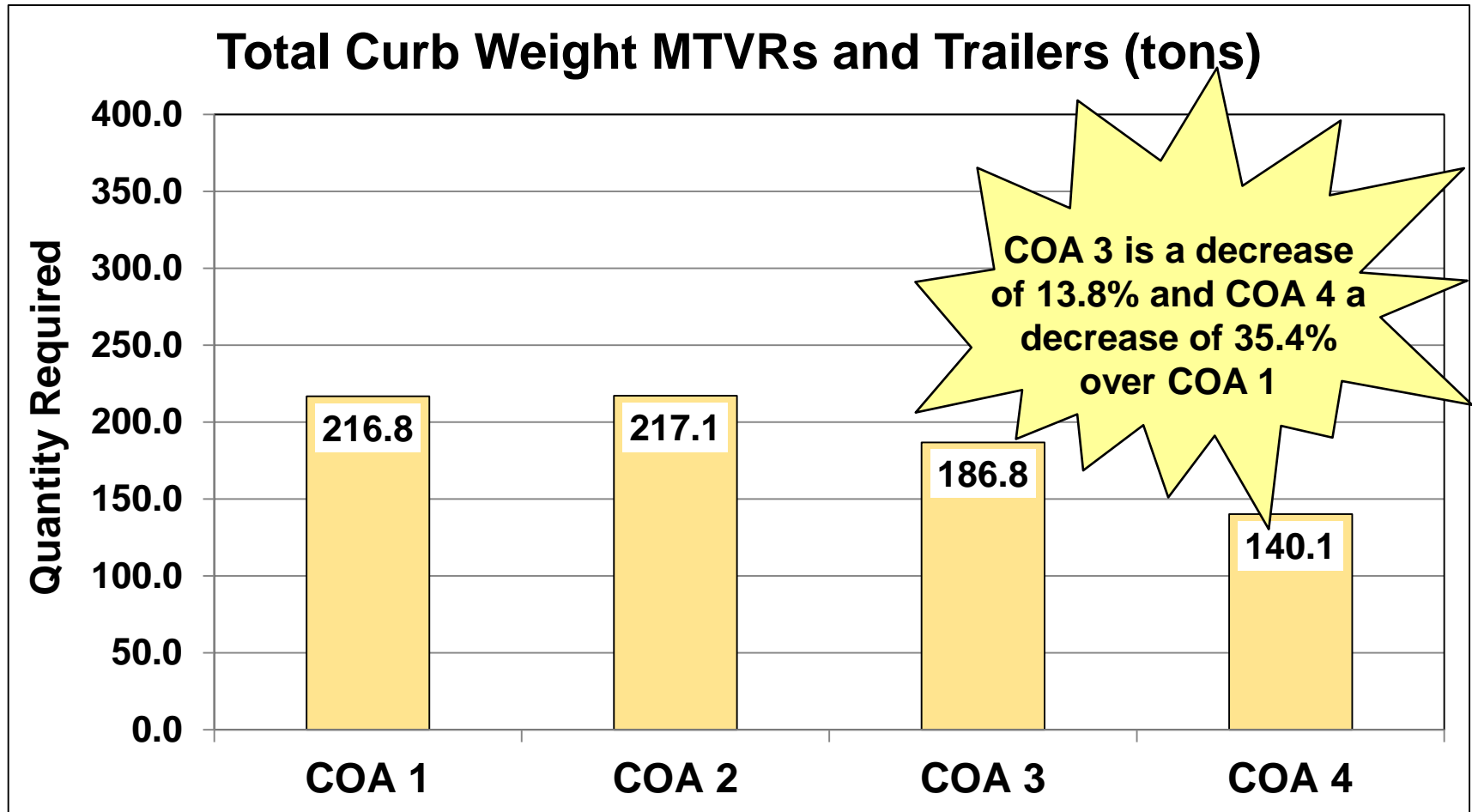
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Findings: MPF MEB Tactical Hqtrs Curb Weight MTRVs and Trailers (tons)



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Findings: Sixcon and Quadcon COA 4 Excursions



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- **Using Sixcons exclusively as the means of packaging either fuel or water increased the required number of MTRVs and Trailers**
- **Using a mix of Sixcons and pallets of 5-gallon water cans produced a result comparable to COA 4**
- **Quadcons can be used for dry cargo other than ammo; again however, a mix of Quadcons and other available packaging produced the best results**

Findings: Amphib MEB DS CLC Motor T Assets to Mobile Load 1 DOS



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<u>Description</u>	<u>Optimal Solution</u>	<u>COA 1</u>	<u>COA 2</u>	<u>COA 3</u>	<u>COA 4</u>
LVSR*	9	0	0	0	0
MTRV	15	32	26	24	22
Cargo Trailer	0	16	25	0	0
Water Trailers	10	16	0	16	0
Modular Trailers	0	0	0	7	21
Total Vehicles & Trailers	34	64	51	47	43
Crew	72	96	78	72	66

Optimization based on minimizing the total number of vehicles and trailers but requires more crew, more fuel, and weighs more than COA 4

* Optimal solution includes LVSR in mix; LVSR zeroed out in COA analysis



Take Aways

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- **COA 4 (New Technology Modular trailers) was the most efficient alternative; reduced number of vehicles and trailers compared to Legacy Specialized Trailers (COA 1):**
 - 32.8% reduction in DS CLC Scenario
 - 45.5% reduction in MPF MEB Tactical Hqtrs Scenario
- **Most of the improvement was due to the increased payload of the New Technology trailer**
 - 81% of the reduction in DS CLC Scenario
 - 60% of the reduction in MPF MEB Tactical Hqtrs Scenario
- **Modular design further enhances the efficiency**
 - 19% additional reduction in DS CLC Scenario
 - 40% additional reduction in MPF MEB Tactical Hqtrs Scenario
- **New technology modular trailers can reduce weight, crew, vehicle square, and fuel usage**

A modular trailer will fully utilize the towing capacity of current MTRV and provide more flexibility in loading compatible supplies



QUESTIONS



BACK-UP

Amphib MEB Surface BLT

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● Units*

- 1 - Infantry Battalion
- 1 - Tank Company Reinforced
- 1 - LAR Company
- 1 - LW155 Battery
- 1 - Combat Engineer Spt Det

Equipment/Personnel

<u>Item</u>	<u>Number</u>
PAX	1,838
EFV	46
Tanks	20
LVSR	16
MTVR	49
MTVR Trailers	33
JLTV	181
JLTV Trailers	47
LW155	6
LAV	28



MPF MEB Tactical Hqtrs

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● Units*

- 1 - MEB Command Element
- 1 - H&S Co, MHG Det
- 1 - P&A Co Det
- 1 - P&A Support Co Det
- 1 - Hqtrs Co Det
- 1 - CI Co Det
- 1 - CI Support Co Det
- 1 - Radio Bn Det
- 1 - Comm Bn Det
- 1 - Civ Aff Grp MHG Det
- 1 - Force Recon Det

Equipment/Personnel

<u>Item</u>	<u>Number</u>
PAX	223
LVSR	1
MTVR	30
MTVR Trailers	11
JLTV	54
JLTV Trailers	1

*Does not include DS CLC

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