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Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Navy										Date: March 2014		
Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604245N / H-1 Upgrades							
COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
Total Program Element	1,509.401	27.724	47.123	44.115	-	44.115	27.433	28.150	28.448	29.709	Continuing	Continuing
2279: 4BW/4BN Upgrade	1,509.401	27.724	-	-	-	-	-	-	-	-	-	1,537.125
3359: H-1 Improvements	0.000	-	47.123	44.115	-	44.115	27.433	28.150	28.448	29.709	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

Note

Efforts previously budgeted in Project 2279 are continued in Project 3359 from FY 2014 through the FYDP.

A. Mission Description and Budget Item Justification

The mission of the AH-1W attack helicopter is to provide rotary wing close air support, anti-armor, armed escort, armed/visual reconnaissance, survivability enhancements, and fire support coordination capabilities under day/night and adverse weather conditions. The mission of the UH-1N utility helicopter is to provide command and control and combat assault support under day/night and adverse weather conditions and special operations support; supporting arms coordination and aeromedical evacuation. Major modifications for both aircraft include 37 AH-1Ws converted to AH-1Zs, build 152 new AH-1Zs, remanufacture ten (10) H-1N helicopters and build 150 new UH-1Y models. AH-1Z and UH-1Y models include a 4-bladed, composite rotor system with semi-automatic blade fold, performance-matched transmissions, T700 Engine Digital Electronic Control Units, 4-bladed tail rotors and drive systems, more effective stabilizers, upgraded landing gear, and common, fully integrated cockpits and avionics systems. These upgrades will add 10,000 flight hours to AH-1Z/UH-1Y airframes. The fully integrated cockpits reduce operator workload and improve situational awareness, thus increasing safety and reducing the rate of aircraft attrition. They will provide considerable growth potential for future weapon systems and avionics, which will significantly increase mission effectiveness and survivability. The cockpits will also include integration of onboard mission planning, communications, digital fire control, self-navigation, night navigation/targeting, air-to-ground missile and air-launched intercept missile weapon systems management in nearly identical crew stations, which significantly reduces training requirements. These upgrades maximize commonality between the two aircraft and provide needed improvements in crew and passenger survivability, payload, power available, endurance, range, airspeed, maneuverability and supportability.

Follow-on improvements to sensors and weapons integration, avionics, and air vehicle components will address deficiencies, systems safety, obsolescence, reliability, supportability and cost growth issues. Improvements will include all associated System Configuration Set (SCS) updates as well as integration and testing related to the aircraft platforms.

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Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)		R-1 Program Element (Number/Name) PE 0604245N / H-1 Upgrades			
B. Program Change Summary (\$ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	31.105	47.123	46.789	-	46.789
Current President's Budget	27.724	47.123	44.115	-	44.115
Total Adjustments	-3.381	-	-2.674	-	-2.674
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.824	-			
• Rate/Misc Adjustments	0.001	-	-2.674	-	-2.674
• Congressional General Reductions Adjustments	-2.558	-	-	-	-
Change Summary Explanation					
Technical: Beginning in FY 2016, technical content of fleet-driven corrections of deficiencies and increased capabilities will be scaled to the reduced budget.					
Schedule: Beginning in FY 2016, schedule of SCS deliveries to the fleet will be extended to meet reduced budget profile.					
Cost: Changes due to sequestration reductions and Congressional general reductions.					

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Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy										Date: March 2014		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604245N / H-1 Upgrades				Project (Number/Name) 2279 / 4BW/4BN Upgrade			
COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
2279: 4BW/4BN Upgrade	1,509.401	27.724	-	-	-	-	-	-	-	-	-	1,537.125
Quantity of RDT&E Articles	0.000	-	-	-	-	-	-	-	-	-		
# The FY 2015 OCO Request will be submitted at a later date.												
Note												
Efforts previously budgeted in Project 2279 are continued in Project 3359 from FY 2014 through the FYDP.												
A. Mission Description and Budget Item Justification												
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)									FY 2013	FY 2014	FY 2015	
Title: System Configuration Set Development									14.831	-	-	
									Articles: -	-	-	
FY 2013 Accomplishments:												
SCS 6.0 - completed operational flight testing												
SCS 7.0 - continued hardware and software development efforts and continued developmental flight testing phase												
SCS 8.0 - completed critical design review (CDR) of TRMC. Continued hardware and software development efforts.												
FY 2014 Plans:												

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)								FY 2013	FY 2014	FY 2015		
N/A												
FY 2015 Plans: N/A												
Title: Weapons and Sensors Testing and Integration								2.471	-	-		
Articles:								-	-	-		
FY 2013 Accomplishments: Continued Target Sight System (TSS) turret test and evaluation activities for hardware and infrared improvement efforts. Aircraft stores development, integration, and testing effort including APKWS, the M299A1 launcher, and Air-Launched Intercept Missile on the AH-1Z.												
FY 2014 Plans: N/A												
FY 2015 Plans: N/A												
Title: Air Vehicle and Avionics Development								10.422	-	-		
Articles:								-	-	-		
FY 2013 Accomplishments: Continued TRB redesign efforts. Continue MRGB "run dry" and component improvement; focus on new sump, coating and filter components. Conduct avionics development & testing on Digital Map/Video Data Link, air vehicle development box, cargo door redesign, Crash Survivable Flight Incident Recorder, design of aircrew restraint system, and Full Motion Video to enhance digitization. Mission computer components obsolescence and regression testing. Continued TRMC hardware redesign with a critical design review (CDR) completed in 4Q13.												
FY 2014 Plans: N/A												
FY 2015 Plans: N/A												
Accomplishments/Planned Programs Subtotals								27.724	-	-		
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost	
• APN/017800: UH-1Y/AH-1Z APN1	762.287	-	-	-	-	-	-	-	-	-	5,357.068	

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C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u> <u>Base</u>	<u>FY 2015</u> <u>OCO</u>	<u>FY 2015</u> <u>Total</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APN/01780C: UH-1Y/AH-1Z APN1 Advance Procurement	64.311	-	-	-	-	-	-	-	-	-	229.680
Remarks											
D. Acquisition Strategy											
The USMC H-1 Upgrades is an ACAT 1C program which has completed Engineering and Manufacturing Development and is in Full Rate Production of UH-1Y and AH-1Z helicopters. Ongoing RDT&E projects are focused on improving reliability and maintainability of the current design, increasing warfighter capability, and enhancing safety and situational awareness characteristics of the aircraft. The prime production contract is a sole source to Bell Helicopter Textron, Inc.											
E. Performance Metrics											
Main Rotor Gear Box (MRGB) loss of lubrication prototype development and testing is an effort to meet the survivability requirement of 30-minutes of operation following a total loss of lubrication. The redesign, development, testing, qualification, and deployment of the MRGB improvements will allow the UH-1Y and AH-1Z to reduce their vulnerable area and greatly improve upon the current 17-minute limitation. This effort will also increase the survival rate of the aircrew and aircraft through improved resistance to ballistic threats.											

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Exhibit R-4, RDT&E Schedule Profile: PB 2015 Navy **Date:** March 2014

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604245N / <i>H-1 Upgrades</i>	Project (Number/Name) 2279 / <i>4BW/4BN Upgrade</i>
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H-1 Upgrades	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Acquisition Milestones																												
Milestones																												
Systems Development																												
Software Development		SCS 6.0																										
			SCS 7.0																									
			SCS 8.0																									
System Configuration Set (SCS) Reviews				8.0 CDR																								
				■																								
Test & Evaluation																												
H-1 Improvements DT			H-1 Imp DT																									
H-1 Improvements Operational Test (OT)			H-1 Imp OT																									
Production Milestones																												
Contract Awards		Lot 10																										
		●																										
Deliveries																												
Software Deliveries		SCS 6.0																										
		▼																										
Aircraft Deliveries		Lot 6 (24)																										
			Lot 7 (27)																									
				Lot 8 (31)																								

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Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604245N / H-1 Upgrades				Project (Number/Name) 3359 / H-1 Improvements			
COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
3359: H-1 Improvements	-	-	47.123	44.115	-	44.115	27.433	28.150	28.448	29.709	Continuing	Continuing
Quantity of RDT&E Articles	0.000	-	-	-	-	-	-	-	-	-		

The FY 2015 OCO Request will be submitted at a later date.

Note
Efforts previously budgeted in Project 2279 are continued in Project 3359 from FY 2014 through the FYDP.

A. Mission Description and Budget Item Justification
The objective of H-1 Improvements is to provide follow-on Research, Development, Test and Evaluation efforts in support of all H-1 aircraft.

H-1 Improvements include System Configuration Set (SCS) development and testing. SCS involves the integration of the entire set of airborne electronics connected via the 1553 data bus and includes much of the electronic hardware and software described in air vehicle, avionics, and sensors and weapons below. This includes correction of hardware and software deficiencies as identified through test and/or due to obsolescence issues.

Air Vehicle and Engine improvements include analysis of structural data to formulate Damage Limits and Tolerances for structural components to reduce life cycle costs and maintenance workload; and redesign of structural components and drive system components to minimize excessive and premature wear, increase reliability, and improve existing design deficiencies. Additional air vehicle upgrades include: redesign of the aircraft power-generating components (generators, inverters, wiring) to support power requirements for existing and future systems (avionics, sensors, and weapons) and to reduce aircraft weight, redesign of the Environmental Control System /Thermal Redesign to support cooling of Technology Refresh Mission Computer and other avionics, and redesign to add an aerial refueling capability.

Avionics improvements target digital inter-operability, integrated avionics, safety & survivability, and situational awareness for both the pilot and aircrew safety. This includes integrating Blue Force Tracking, Joint Battle Command-Platform (JBC-P) Full Motion Video (FMV), Degraded Visual Environment (DVE), Helmet Mounted Display improvements, cockpit displays, precision and GPS non-precision landing capability, crash survivable flight incident recorder, collision avoidance, improved Embedded Global Positioning System (EGI), Inertial Navigation System (INS), targeting sensor systems and mission computer. H-1 capability improvements include improved Aircraft Survivability Equipment (ASE), digital operations & transfer of data, digital interoperability, digital video recording, video and data networking, and information integration with aviation combat elements and Marine Air Ground Task Force elements. Mandated capability efforts include CNS/ATM, Required Navigation Performance/Area Navigation (RNP/RNAV), GPS Selective Availability Anti-Spoofing Module (SAASM), Automatic Dependent Surveillance - Broadcast (ADS-B), development efforts required for Depot standup and incorporation of technology and information protection/Information Assurance in critical avionics and sensor systems. In addition, the goal is to reduce total ownership cost for H-1 aircraft and related support systems by improving reliability and maintainability of critical flight and avionics systems along with associated peculiar avionics support equipment and incorporating fact-of-life obsolescence solutions.

Sensors and Weapons improvements include upgrades and reliability initiatives, hardware and infrared improvements for the Targeting Sight System and BRITE Star Sensors. These enhancements will provide upgraded performance, improve overall design, producibility and maintainability. In addition, several aircraft stores

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integration efforts are being performed. The AN/ALQ-231 (V) Intrepid Tiger II Electronic Warfare Pod will be integrated to provide a new Electronic Warfare capability to the UH-1Y. The Joint Air to Ground Missile (JAGM) and AGM-114 Romeo Hellfire missiles will begin integration efforts starting in FY14. These missiles will provide new interfaces to the aircraft that allow for better targeting capabilities with a new millimeter wave sensor (JAGM), provide enhanced lethality with greater fuze functionality and incorporate a new multi-effects warhead. Continued improvements to aircraft armament systems and ordnance systems will continue with additional operational testing of Advanced Precision Kill Weapons (APKWS), and M299 Launcher improvements.					
These improvements will provide considerable growth potential for future weapon systems, air vehicle improvements, software improvements, and avionics upgrades, which will significantly increase mission effectiveness & survivability, while potentially reducing life cycle costs. The cockpits will also include integration of onboard mission planning, communications, digital fire control, self-navigation, night navigation/targeting, precision guided munitions, and air-launched intercept missile weapon systems management in nearly identical crew stations, which significantly reduce training requirements. These upgrades maximize commonality between all H-1 Type/Model/Series aircraft and provide needed improvements in crew and passenger reliability, survivability, payload, power available, endurance, range, airspeed, maneuverability and supportability.					
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)			FY 2013	FY 2014	FY 2015
Title: System Configuration Set Development Articles: FY 2013 Accomplishments: N/A FY 2014 Plans: SCS 8.0- continue requirements definition and completion of design/development process. Correction of hardware and software correction of deficiencies as identified through test and/or due to obsolescence issues. FY 2015 Plans: FY 2015 plans - SCS 8.0 - Correction of hardware and software deficiencies as identified through test and/or due to obsolescence issues. SCS 8.0 is planned in two increments, SCS 8.1 and SCS 8.2, and will address key avionics and sensors obsolescence issues that affect Aircraft Production Lots. SCS 8.1 will continue development and flight test of Tech Refresh Mission Computer (avionics obsolescence issue required to support delivery of production aircraft beginning with Lot 11/FY 2014), Target Sight System (TSS) Turret Electronics Unit (TEU) (electro-optical sensor obsolescence issue required to support production aircraft beginning with Lot 13/FY 2016), and the associated System Security Engineering (SSE) improvements required as DoD mandates for both updated avionics and updated sensor electronics. SCS 8.2 will continue the design and development of Radar Warning Set AN/APR-39 D(V)2 (sensor/avionics obsolescence issue required to support Lot 14/FY 2017), the Advanced Data Transfer System (ADTS) needed for digital map data to meet Terrain Awareness Warning System (TAWS) mandate, and Airborne Network Switch (ANS) needed to switch multiple devices to communicate with the TRMC via ethernet.			-	22.295	19.838
			-	-	-
Title: Weapons and Sensors Testing and Integration Articles:			-	6.787	6.105
			-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)			FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: N/A					
FY 2014 Plans: Continue Target Sight System turret test and evaluation for hardware and infrared improvement efforts; initiate aircraft stores development, integration, and testing efforts including Advanced Precision Kill Weapon System, the M299A1 launcher, and Air-Launched Intercept Missiles on the AH-1Z.					
FY 2015 Plans: Develop, test and integrate hardware, software changes to address parts obsolescence and deficiencies identified in test for aircraft sensors; Target Sight Systems (TSS) and the BRITE Star II. Begin software integration of Joint Air to Ground Missile and AGM-114 Romeo Missile to test functionality and compatibility with aircraft software. Collect flight test data, to include captive carriage noise and vibration as well conduct safe separation analysis. Continue to refine rocket boresight and launch profiles to improve effectively of the Advanced Precision Kill System (APKWS). Conduct captive carriage and development/operational testing of the AN/ALQ-231 Intrepid Tiger, to include conducting feasibility studies as well as operational evaluations.					
Title: Air Vehicle and Engines Improvements			-	15.356	15.455
Articles:			-	-	-
FY 2013 Accomplishments: N/A					
FY 2014 Plans: Initiate redesign of structural components including UH-1Y floor boards attach beams/belly access panels, the elevator, the landing gear skid tubes, UH-1Y cargo doors, and the Improved Defensive Armament System; Environmental Control System/ Thermal Redesign to support cooling of Tech Refresh Mission Computer (TRMC)/Mission Computer (MC); redesign of the aircraft power generating components (generator, inverters, wiring) to support power requirements for existing and future system (avionics, sensors and weapons) and to reduce aircraft weight; and redesign of the environmental control system for cooling of the TRMC/MC, and redesign of the drive system components to increase reliability and reduce high cost and/or failure deficiencies.					
FY 2015 Plans: Complete aircraft flight load survey and conduct analysis of structural data to formulate Damage Limits and Tolerances for composite and metal structural components to reduce life cycle costs, and maintenance workload; continue redesign of structural components to minimize excessive and premature wear, increase reliability, and improve existing design deficiencies. Initiate redesign of the auxiliary fuel system, and initiate aerial refueling capability. Continue air vehicle and engine improvements upgrades to include redesign of the aircraft power-generating components (generator, inverters, wiring) to support power requirements for existing and future systems (avionics, sensors and weapons) and to reduce aircraft weight. Continue redesign of structural components including UH-1Y floor boards, attach beams/belly access panels, the elevator, the landing gear skid					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)										FY 2013	FY 2014	FY 2015
tubes, UH-1Y cargo doors, and the Improved Defensive Armament System; continue Environmental Control System/Thermal Redesign to support cooling of Tech Refresh Mission Computer/Mission Computer and other avionics. Continue redesign of the drive system components (rotor brake/slip ring/standpipe/gearboxes/drive shaft & couplers/chip detectors) to increase reliability and reduce high cost and/or failure deficiencies.												
Title: Avionics Improvements										-	2.685	2.717
Articles:										-	-	-
FY 2013 Accomplishments: N/A												
FY 2014 Plans: Continue avionics development & testing on Digital Map and data storage capability, avionics components obsolescence and regression testing begun in 2279; initiate development efforts on Terrain Awareness Warning System, which determines whether there is high risk of controlled flight into terrain in support of the Ground Proximity Warning System. Continue Full Motion Video design/development and digital interoperability efforts.												
FY 2015 Plans: Continue avionics development & testing on Digital Map and data storage capability, digital video recording, digital systems upgrades, avionics components obsolescence and regression testing; continue development efforts on Terrain Awareness Warning System. Continue enhanced digital capability efforts, Aircraft Survivability Equipment (ASE) improvements, Helmet Mounted Display improvements, avionics systems obsolescence mitigation efforts, development of peculiar avionics support equipment, and development of automatic test equipment. Continue Full Motion Video design/development and digital interoperability efforts to receive and send video imagery for situational awareness and to reduce the kill chain while complying with rules of engagement for targeting accuracy, maintaining positive ID, and for timely Battle Damage Assessment.												
Accomplishments/Planned Programs Subtotals										-	47.123	44.115
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost	
• APN/017800: UH-1Y/AH-1Z APN1	-	604.634	778.757	-	778.757	838.611	847.323	828.191	876.429	443.998	5,217.943	
• APN/017800C: UH-1Y/AH-1Z APN1 Advance Procurement	-	60.000	80.926	-	80.926	76.686	78.040	84.290	62.700	-	442.642	
Remarks												

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<p>D. Acquisition Strategy</p> <p>Both UH-1Y and AH-1Z are currently in the follow-on test and evaluation period. Planning and testing has begun to evaluate enhancements such as incorporating improvements to address critical reliability deficiencies, avionics upgrades to improve existing capability including sending/receiving data in battlefield conditions, additional weapons and sensor capabilities, and Engineering Change Proposals as they are funded and approved. Test and Evaluation Master Plan revisions will be developed in support of testing for future enhancements. Future engineering changes will be funded to correct deficiencies as identified by test and fleet usage. Additional upgrades to the aircraft will be completed incrementally as requirements are defined and funded.</p> <p>E. Performance Metrics</p> <p>System Configuration Set (SCS) 7.0 software delivery 1Q FY 2015. SCS 8.1 software delivery 2Q FY 2016. SCS 8.2 software delivery 3Q FY 2018. Successfully complete Developmental Test and Operational Test for H-1 Improvements.</p>		

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Exhibit R-4, RDT&E Schedule Profile: PB 2015 Navy													Date: March 2014																																															
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H-1 Improvements													FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019																							
													1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q																				
Systems Development																																																												
Software Development													SCS 7.0																																															
													SCS 8.1																																															
													SCS 8.2																																															
																													SCS 9.0																															
Test & Evaluation																																																												
H-1 Improvements Development Test																													DT																															
H-1 Improvements Operational Test													OT																																															
Deliveries																																																												
Software Deliveries																	SCS 7.0 ▼								SCS 8.1 ▼												SCS 8.2 ▼																							
Aircraft Contract Awards													Lot 11 ●								Lot 12 ●								Lot 13 ●								Lot 14 ●								Lot 15 ●								Lot 16 ●							
Aircraft Deliveries													Lot 8 (31)																																															
													Lot 9 (25)																																															
																					Lot 10 (28)								Lot 11 (26)								Lot 12 (24)								Lot 13 (24)								Lot 14 (24)							
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