



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

# CRAF Crew Rest Study: Proposed FAA Changes

AFIT

Dr. James Moore  
Ms. Jessica Leslie  
Ms. Tiffany Harper  
Mr. Jordan Goldmeier

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# Problem Description



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

- FAA has proposed changes to flight crew member duty and rest requirements
  - How will these changes effect the CRAF program and organic flight operations?
    - Will current CRAF routes need to be altered?
    - Will CRAF require more aircrew augmentation?
    - Will the CRAF aircrew run out of duty day under the new rules if there is a delay enroute?



# Daily Flight Time



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- Current:
  - 8 hour limit for un-augmented operations
  - Extended to 12 hours for 3 flightcrew members
  - Extended to 20 hours for 4 pilots (or 3 pilots and 2 flight engineers), but must have an FAA-approved rest facility
- Proposed:
  - Un-augmented flight time

Time of Start (Home Base)	Maximum Flight Time (Hours)
0000-0459	8
0500-0659	9
0700-1259	10
1300-1959	9
2000-2359	8

- 16 hour limit for augmented operations



# Flight Duty Period



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- Current: 16-20 hours
- Proposed:

Time of Start (Home Base or Acclimated)	Maximum Flight Duty Period (hours) for Lineholders Based on Number of Flight Segments						
	1	2	3	4	5	6	7+
0000-0359	9	9	9	9	9	9	9
0400-0459	10	10	9	9	9	9	9
0500-0559	11	11	11	11	10	9.5	9
0600-0659	12	12	12	12	11.5	11	10.5
0700-1259	13	13	13	13	12.5	12	11
1300-1659	12	12	12	12	11.5	11	10.5
1700-2159	11	11	10	10	9.5	9	9
2200-2259	10.5	10.5	9.5	9.5	9	9	9
2300-2359	9.5	9.5	9	9	9	9	9

2-hour extension (3-hour extension for augmented operations) for unforeseeable circumstances once in 168-hour period



# Augmentation



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- Current:
  - Flight time extended to 12 hours for 3-man crew
  - Extended to 20 hours for 4 pilots (or 3 pilots and 2 flight engineers), but must have an FAA-approved rest facility
- Proposed:

Time of Start (Home Base or Acclimated)	Maximum Flight Duty Period (hours) for Lineholders Based on Rest Facility and Number of Pilots					
	Class 1 Rest Facility		Class 2 Rest Facility		Class 3 Rest Facility	
	3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
0000-0559	14	16	13	14.5	12	12.5
0600-0659	15	17.5	14	15.5	13	13.5
0700-1259	16	18	15.5	17	14	14.5
1300-1659	15	17.5	14	15.5	13	13.5
1700-2359	14	16	13	14.5	12	12.5

Reduce by 30 minutes if crew is not acclimated. Acclimated operations capped at 16 hours for 3-man crew and 18 hours for 4-man crew



# Assumptions



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## Data Source

- Analysis is based on 5 months of GDSS Data (May-Sept. 2010)

## Assumptions

- In the analysis, Block to Block time from GDSS is the Flight Time as defined in the Notice of Proposed Rulemaking (NPRM)
- Pilots report for duty 1.5 hours prior to scheduled flight departure (page 43 of NPRM and SME knowledge of Maj Eric Bucheit (pilot))
- Not considering credits earned for split duty period
  - CRAF carriers group together and share credits
- All crew members are assumed to be acclimated
- Assume pilots showed up at report time and were not on call



# Analysis Summary



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- Number of Missions Analyzed: 2264
  - Missions were analyzed by segmented Flight Duty Period (FDP)
  - The flight duty period was split by crew swaps or crew rest. Each split for swaps or crew rest is considered a mission segment in our analysis.
    - For example:
      - Mission Segment 1 – CONUS to Europe
      - Mission Segment 2 – Europe to Theater (Middle East) to Europe
      - Mission Segment 3 – Europe to CONUS
  - Mission Feasibility

	Current	Proposed						
		No Rest Facility	Class 3		Class 2		Class 1	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
Feasible	2181	427	886	1065	1315	1800	1676	1988
Infeasible*	83	1837	1378	1199	949	464	588	276

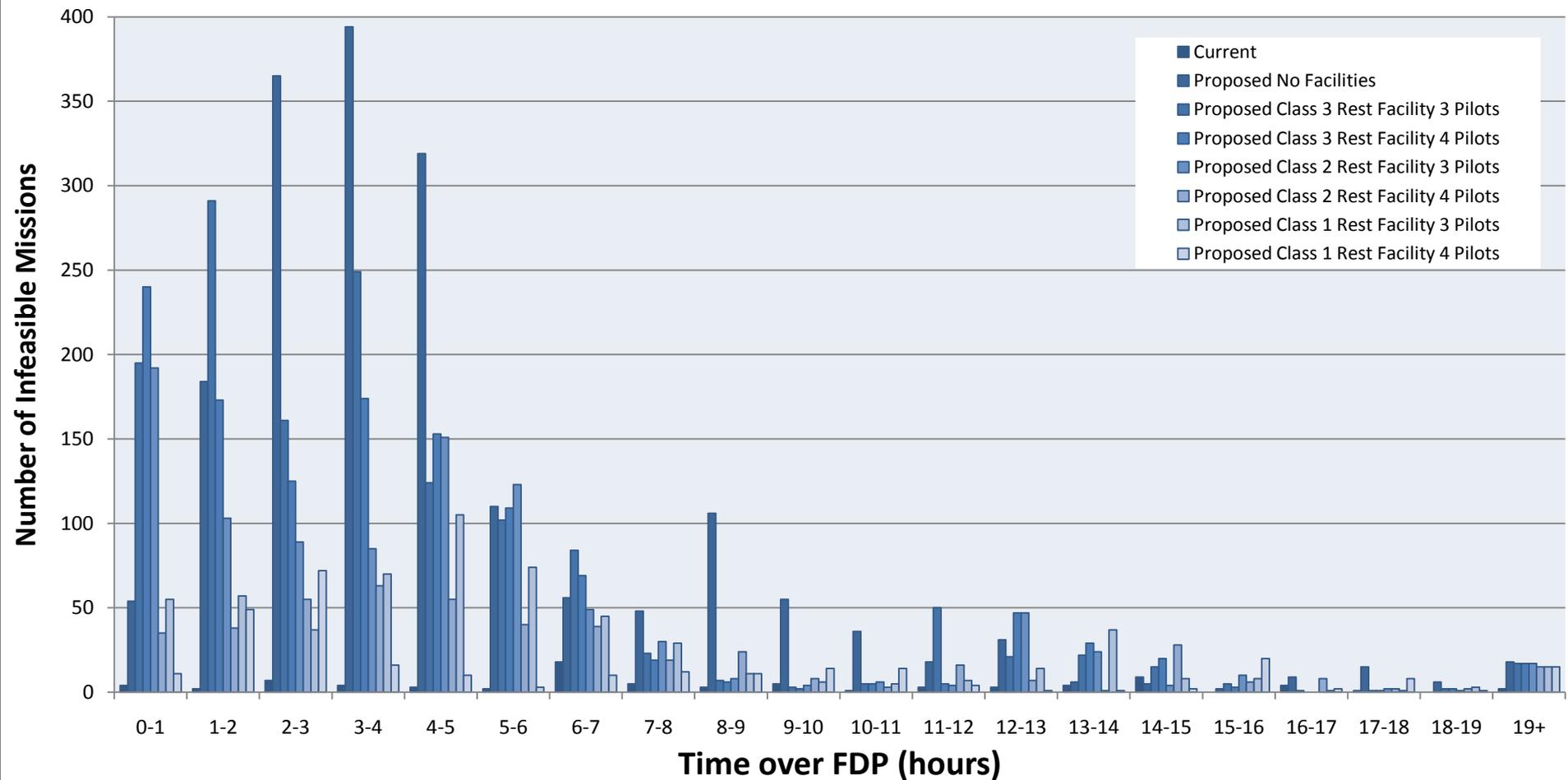
\*Infeasible missions have a flight duty period beyond the maximum allowable FDP.



# Infeasible Missions



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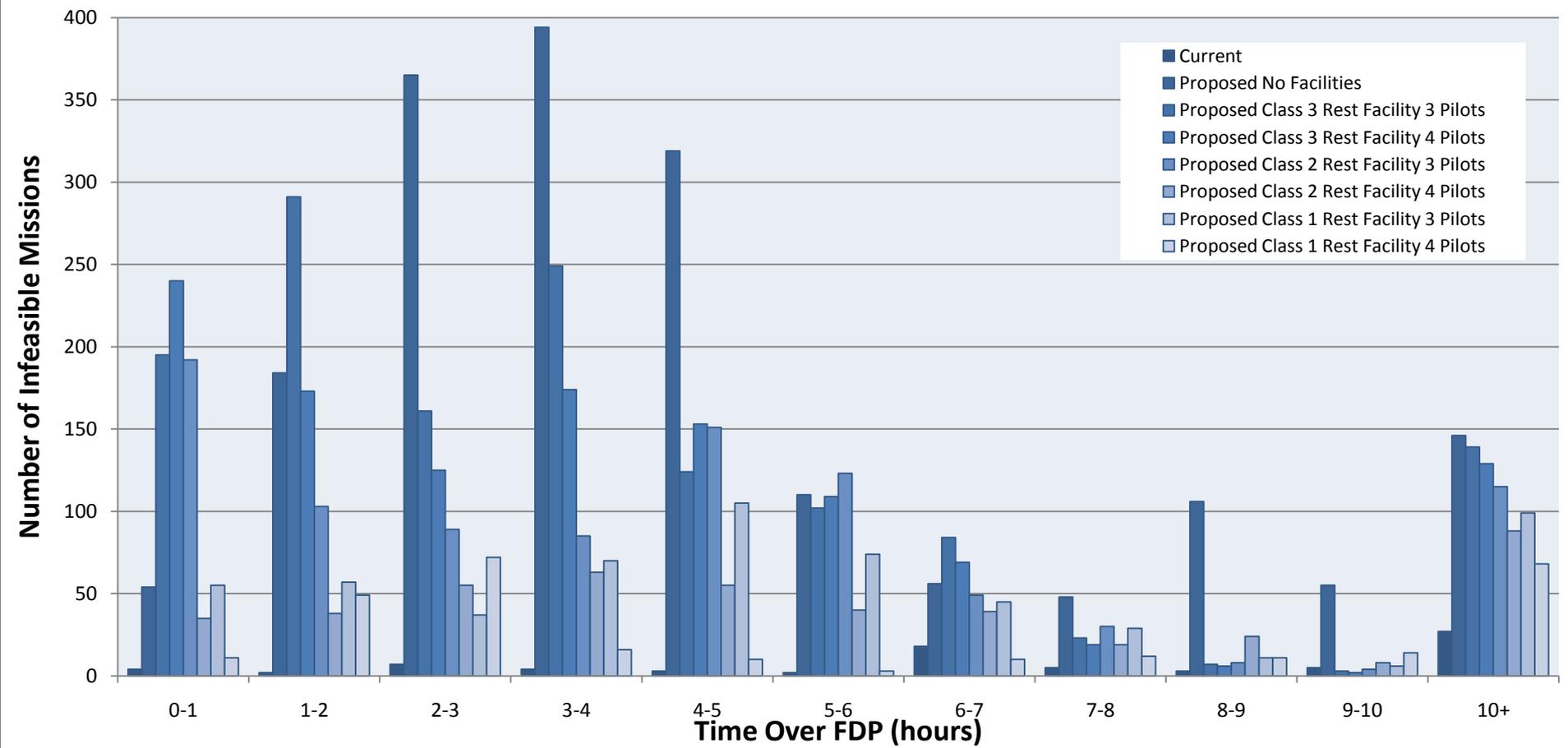
This chart depicts the distribution of time exceeding a mission's FDP.



# Infeasible Missions



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This chart is a condensed version of the previous slide to better depict the distribution of missions from 0-10 hours over FDP



# Region Specific Mission Comments



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- 40 missions from the NW Pacific to Diego Garcia NSF to Bahrain and back, round trip

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	20	40	40	40	39	23	24	21
Avg. Hours Over	6.75	10.52	8.00	7.50	7.19	10.48	10.41	9.94
Max Hours Over	7.28	18.28	15.28	14.78	14.28	12.78	13.28	11.28

- 20 missions from CONUS to Europe to Manas and back, round trip

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	0	20	20	18	10	0	0	0
Avg. Hours Over	-	3.75	1.44	1.94	2.62	-	-	-
Max Hours Over	-	4.27	2.17	2.67	3.15	-	-	-



# Region Specific Mission Comments



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

- 20 CONUS to Africa and back, round trip

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	0	22	17	6	2	0	0	0
Avg. Hours Over	-	3.27	0.71	1.14	1.30	-	-	-
Max Hours Over	-	4.20	1.33	1.83	2.00	-	-	-

- 30 missions from CONUS to Europe to Africa and back, round trip

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	1	28	5	2	2	2	2	2
Avg. Hours Over	3.25	4.20	5.45	7.03	6.53	5.03	5.53	3.53
Max Hours Over	3.25	12.43	10.93	9.93	9.43	7.93	8.43	6.43





# Region Specific Mission Comments



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- 635 one way missions into Theater (Middle East)

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	11	605	512	430	323	142	215	39
Avg. Hours Over	8.44	3.30	3.18	3.48	3.86	5.24	4.65	5.75
Max Hours Over	16.17	17.20	15.17	14.67	13.67	12.70	13.17	14.70

- These missions “ended” in theater but had to be repositioned. The repositioning time was included in the FDP.
- 1,008 missions from CONUS to Europe into Theater (Middle East) and back, round trip

	Current Rules	Proposed Rules						
		No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
			3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
# Infeasible Missions	38	852	538	467	347	110	147	72
Avg. Hours Over	8.69	5.30	4.70	4.82	5.60	12.21	10.32	14.45
Max Hours Over	39.53	50.53	47.53	47.03	46.53	45.03	45.53	43.53



# Summary



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- The current rules require augmentation to any mission over 8 hours of flight time
- The proposed rules allow for possible increased flight time of 8-10 hours based on the mission's departure time
  - Increased flight time reduces augmentation costs for specific flights
- The proposed rules allow for better fatigue mitigation but possibly increase congestion
- The number of infeasible missions increase under the proposed rules and will need to be addressed by the addition of crew swaps and/or crew rest on the routes as currently configured, or by changing the current route configurations.



# Summary



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- These findings suggest that the airlines are currently running optimally. They run as close to the maximum limitations as possible to increase profit. As the limitations change, it would be assumed they would again find the optimum solution to continue the missions.
- It appears the NPRM and/or FRMS have given more fatigue credit for Class 2 rest facility and 4 pilots than a Class 1 rest facility and 3 pilots.
- Our assumption is that with 4 pilots you can completely rotate the crews; 2 pilots rest while 2 pilots fly, allowing for a better quality of rest.



# Summary



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- Class 1 rest facilities appear to have the maximum benefit for long haul missions.
- For anything less than 4 hours over the maximum FDP, it appears that if there are resources available to swap crews, that would be the ideal choice.



# Sources



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

- NPRM. FAA-2009-1093; Notice No. 10-11, RIN 2120-AJ58. *Flight Member Duty and Rest Restrictions*, Notice of proposed rulemaking (NPRM).



# Backup Slides



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# Infeasibility Summary



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Route (all round trip unless otherwise specified)	# Missions	Information	Current Rules	Proposed Rules						
				No Rest Facility	Class 3 Rest Facility		Class 2 Rest Facility		Class 1 Rest Facility	
					3 Pilots	4 Pilots	3 Pilots	4 Pilots	3 Pilots	4 Pilots
NW Pacific to Diego Garcia NSF to Bahrain	40	# Infeasible Missions	20	40	40	40	39	23	24	21
		Avg. Hours Over	6.75	10.52	8.00	7.50	7.19	10.48	10.41	9.94
		Max Hours Over	7.28	18.28	15.28	14.78	14.28	12.78	13.28	11.28
CONUS to Manas	20	# Infeasible Missions	0	20	20	18	10	0	0	0
		Avg. Hours Over	-	3.75	1.44	1.94	2.62	-	-	-
		Max Hours Over	-	4.27	2.17	2.67	3.15	-	-	-
CONUS to Africa	22	# Infeasible Missions	0	22	17	6	2	0	0	0
		Avg. Hours Over	-	3.27	0.71	1.14	1.30	-	-	-
		Max Hours Over	-	4.20	1.33	1.83	2.00	-	-	-
CONUS to Europe to Africa	30	# Infeasible Missions	1	28	5	2	2	2	2	2
		Avg. Hours Over	3.25	4.20	5.45	7.03	6.53	5.03	5.53	3.53
		Max Hours Over	3.25	12.43	10.93	9.93	9.43	7.93	8.43	6.43
CONUS to Europe	47	# Infeasible Missions	0	47	39	39	39	38	38	38
		Avg. Hours Over	-	8.04	5.59	5.11	4.64	3.21	3.71	1.75
		Max Hours Over	-	10.23	7.30	6.80	6.30	4.80	5.30	4.15
CONUS to NE & NW Pacific	201	# Infeasible Missions	9	190	188	180	171	138	149	96
		Avg. Hours Over	3.82	6.67	4.58	4.33	4.13	3.47	215.00	2.89
		Max Hours Over	8.28	23.70	23.70	23.70	23.70	23.70	23.70	23.70
One Way Missions to Theater (Middle East)	635	# Infeasible Missions	11	605	512	430	323	142	215	39
		Avg. Hours Over	8.44	3.30	3.18	3.48	3.86	5.24	4.65	5.75
		Max Hours Over	16.17	17.20	15.17	14.67	13.67	12.70	13.17	14.70
Missions to Theater (Middle East)	1,008	# Infeasible Missions	38	852	538	467	347	110	147	72
		Avg. Hours Over	8.69	5.30	4.70	4.82	5.60	12.21	10.32	14.45
		Max Hours Over	39.53	50.53	47.53	47.03	46.53	45.03	45.53	43.53
Other	261	# Infeasible Missions	1	33	14	12	11	6	8	1
		Avg. Hours Over	11.95	3.63	5.15	4.88	4.72	3.23	2.88	14.42
		Max Hours Over	11.95	20.92	18.92	18.42	17.92	16.42	16.92	14.42
2264 Missions Analyzed		Total # Infeasible =	80	1837	1373	1194	944	459	583	269
		% Infeasible =	4%	81%	61%	53%	42%	20%	26%	12%



# Specific Examples of Impact on CRAF



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

Vast majority of AMC missions operate during 1700-0600

- 2 hour FDP reduction during this time will call for increase in crewmembers and reduce ability to continue a mission that has been delayed

Flight segment from Leipzig, Germany to Ft. Campbell, KY that proceeds onto Ft. Hood, Tx will require a crew change in Ft. Campbell, regardless of whether it is a 2, 3, or 4-man crew departing from Leipzig

- FDP is well within the limits, but the short last flight segment does not allow the 2 hours of in-flight rest for the flying pilot

WOA MD11 Freighters utilized for AMC missions do not have crew bunks and no credit given for coach seats

- Without aircraft modification shorter segments will be required to switch crews leading to lengthier mission durations
- Similar problem reported by Miami Air leading to inability to support CRAF missions



# Sources



Center for Operational Analysis (COA), Department of Operational Sciences (ENS), Air Force Institute of Technology (AFIT)

- Fischer, Ross (CEO-Miami Air International). Email: Impact of Flightcrew Member Duty and Rest Requirements NPRM. October 7, 2010.
- Global Aviation Holdings. Briefing: Impact of FAA's Proposed Flight, Duty and Rest Changes to the AMC Mission. October 2010.
- National Airlines. Impact of FAA NPRM for Flight Crew Member Duty and Rest Requirements. October 6, 2010.
- Ryan International Airlines. Cost Estimate for Implementing Flightcrew Member Duty and Rest Requirements. October 7, 2010.
- United States Transportation Command, Command Acquisition. 2010. *Final Uniform Rates and Rules for International Service.*