

APPENDIX E – NMSU VO TEST CARDS



ASSURE A46 – Validation of Visual Operation Standards for Small Uncrewed Aircraft Systems (sUAS)

Task 3.1 – NMSU Test Cards

July 27, 2022

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A46 VO Testing – Master Test Card



Figure 1. Wide view of NMSU Testing Area.

The Visual Observer (VO) location is at the New Mexico State University (NMSU) College Ranch. Las Cruces is due south of the testing area, and the Las Cruces International Airport is south and slightly west of the testing area (solid red border lines represent the edges of White Sands Missile Range's restricted airspace).

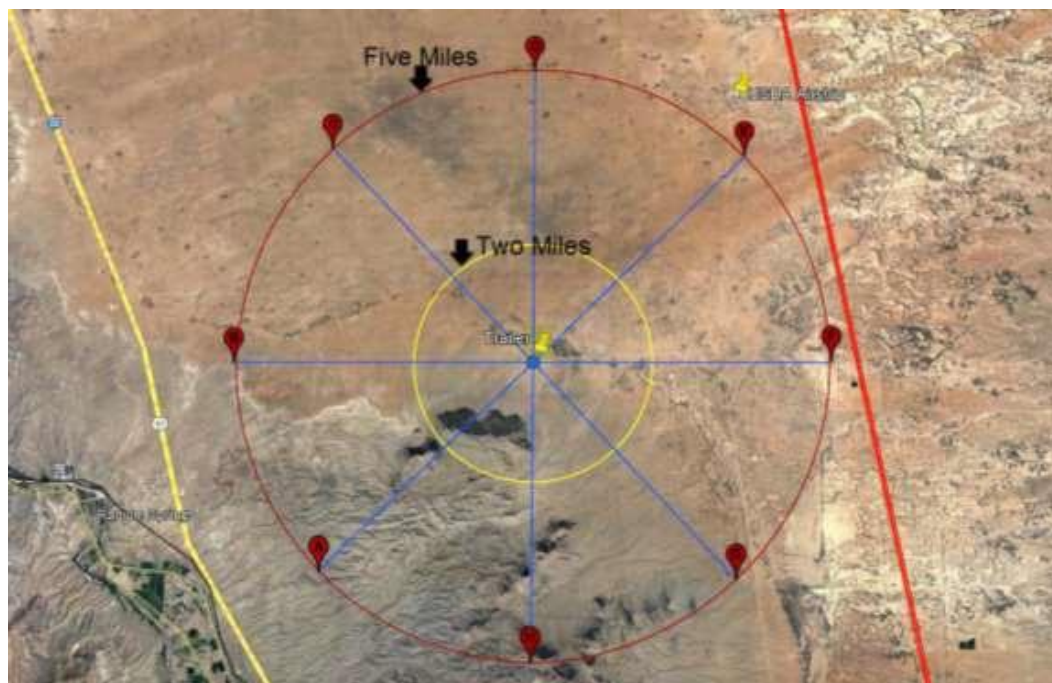


Figure 2. close up view of the VO testing area at the NMSU College Ranch.

Crewed flights will originate at the Las Cruces International Airport and transit to the VO testing area. Crewed aircraft will set up for each run at ~5 miles out from the center “X” of the testing area. Each crewed run will originate at the associated letter location, transit to the center “X” location, and then exit toward the designated letter location. Aircraft will be flown at 500 ft and 700 ft across the testing area. Small Unmanned Aircraft System (sUAS) flights will be simulated. If actual sUAS flights are desired, optional test cards are provided for sUAS flying in a Box, a simulated Linear Infrastructure inspection, a Mapping mission, and a circular Orbit mission.

Table 1. Order of Events.

Order of Events			
✓	Day	UAS Test Card	Crewed Test Card
	1	Simulated	VO-M-500-1
	2	Simulated	VO-M-700-5
	3	Simulated	VO-M-500-2
	4	Simulated	VO-M-700-6
	5	Simulated	VO-M-500-3
	6	Simulated	VO-M-700-4
	7	Simulated	Repeat desired cards
	8	Simulated	Repeat desired cards
	9	Simulated	Repeat desired cards
	10	Simulated	Repeat desired cards
	Optional	VO-UM-Box200-1	VO-M-500-1, VO-M-500-2, or VO-M-500-3
	Optional	VO-UM-Box400-2	VO-M-700-4, VO-M-700-5, or VO-M-700-6
	Optional	VO-UM-Linear200-3	VO-M-500-1, VO-M-500-2, or VO-M-500-3
	Optional	VO-UM-Linear400-4	VO-M-700-4, VO-M-700-5, or VO-M-700-6
	Optional	VO-UM-Map200-5	VO-M-500-1, VO-M-500-2, or VO-M-500-3
	Optional	VO-UM-Map400-6	VO-M-700-4, VO-M-700-5, or VO-M-700-6
	Optional	VO-UM-Orbit200-7	VO-M-500-1, VO-M-500-2, or VO-M-500-3
	Optional	VO-UM-Orbit400-8	VO-M-700-4, VO-M-700-5, or VO-M-700-6

A46 VO Crewed Test Card 1 – VO-M-500-1

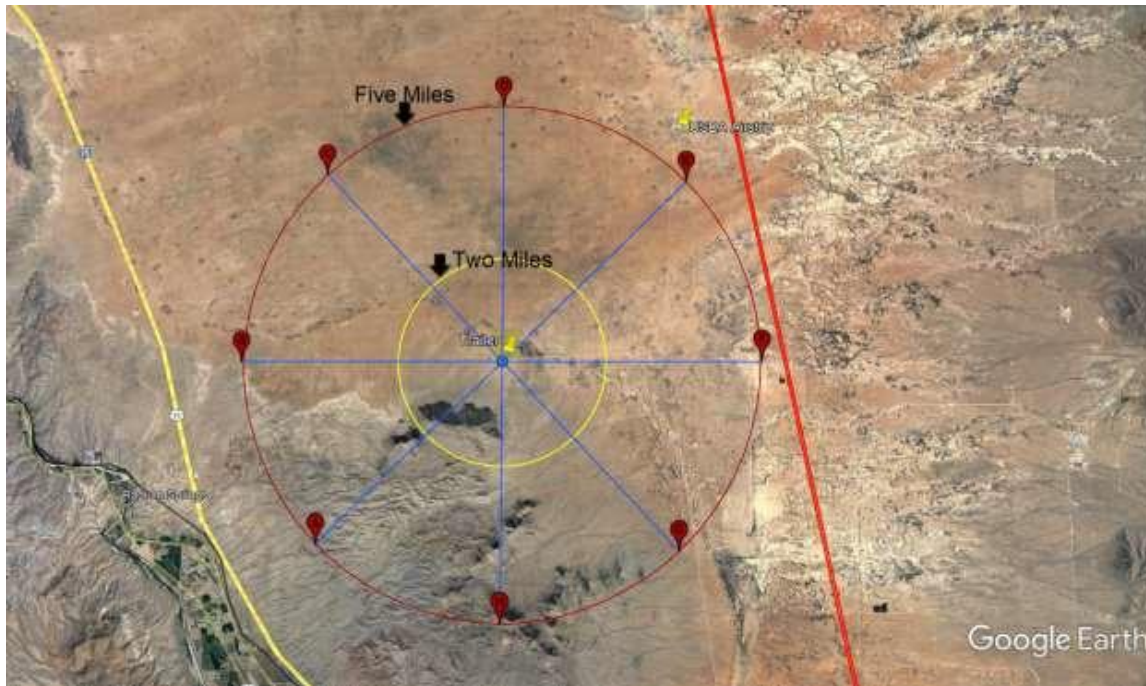


Figure 3. Crewed Aircraft Test Card 1 Operating Location.

Table 2. Crewed Aircraft Test Card 1 Flight Paths.

VO-M-500-1				
✓	Action	Remarks	Call	Time
1	A-X-E --- F			
2	F-X-B --- C			
3	C-X-G --- H			
4	H-X-D --- E			
5	E-X-A --- B			
6	B-X-F --- G			
7	G-X-C --- D			
8	D-X-H --- A			
9	A-X-D --- E			
10	E-X-H --- A			
11	A-X-F --- E			
12	E-X-B --- C			
13	C-X-H --- G			
14	G-X-B --- C			
15	C-X-F --- G			
16	G-X-D --- B			
17	B-X-E --- D			
18	D-X-A --- B			
19	B-X-G --- F			
20	F-X-C --- D			
21	D-X-G --- F			
22	F-X-A --- H			
23	H-X-C --- H			
24	H-X-E			

Table 3. Crewed Aircraft Test Card 1.

Flight Card #	VO-M-500-1	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	500 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Crewed Test Card 2 – VO-M-500-2

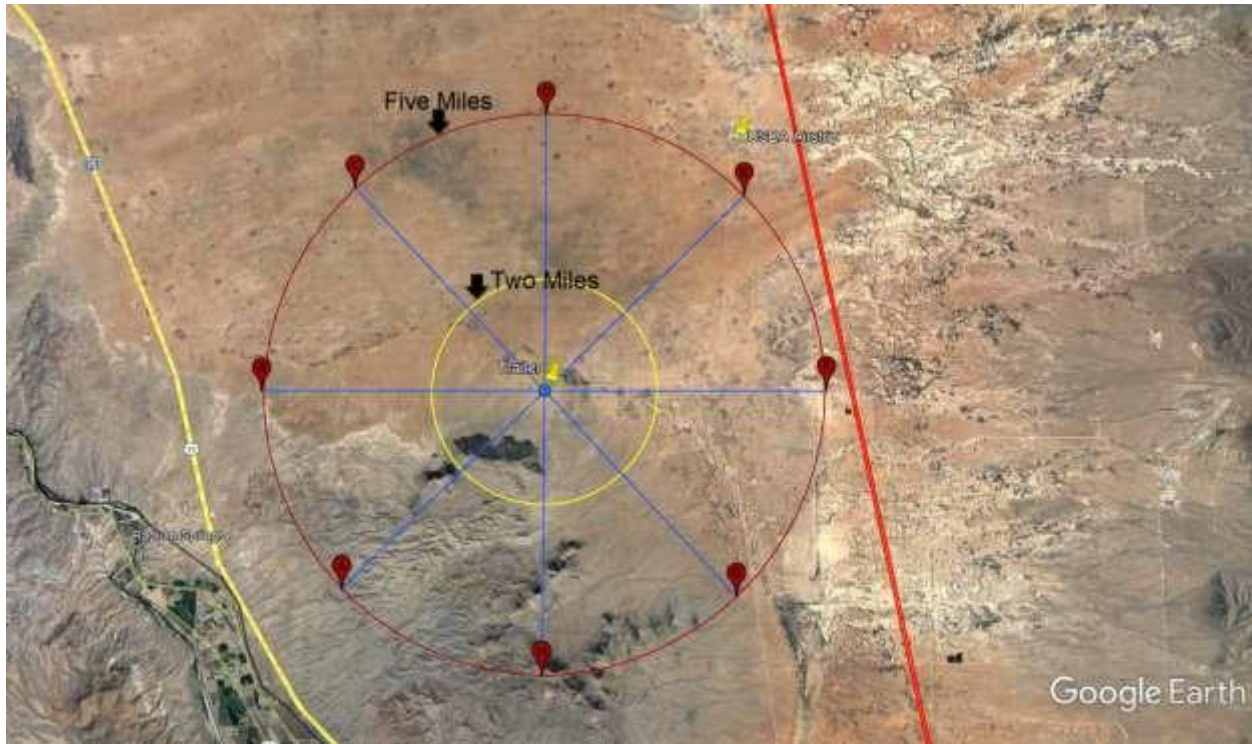


Figure 4. Crewed Aircraft Test Card 2 Operating Location.

Table 4. Crewed Aircraft Test Card 2 Flight Paths.

VO-M-500-2				
✓	Action	Remarks	Call	Time
1	A-X-H --- G			
2	G-X-F --- E			
3	E-X-D --- C			
4	C-X-B --- A			
5	H-X-G --- F			
6	F-X-E --- D			
7	D-X-C --- B			
8	B-X-A --- B			
9	B-X-C --- D			
10	D-X-E --- F			
11	F-X-G --- H			
12	H-X-A --- C			
13	C-X-D --- E			
14	E-X-F --- G			
15	G-X-H --- A			
16	A-X-B --- C			

Table 5. Crewed Aircraft Test Card 2.

Flight Card #	VO-M-500-2	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	500 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Crewed Test Card 3 – VO-M-500-3

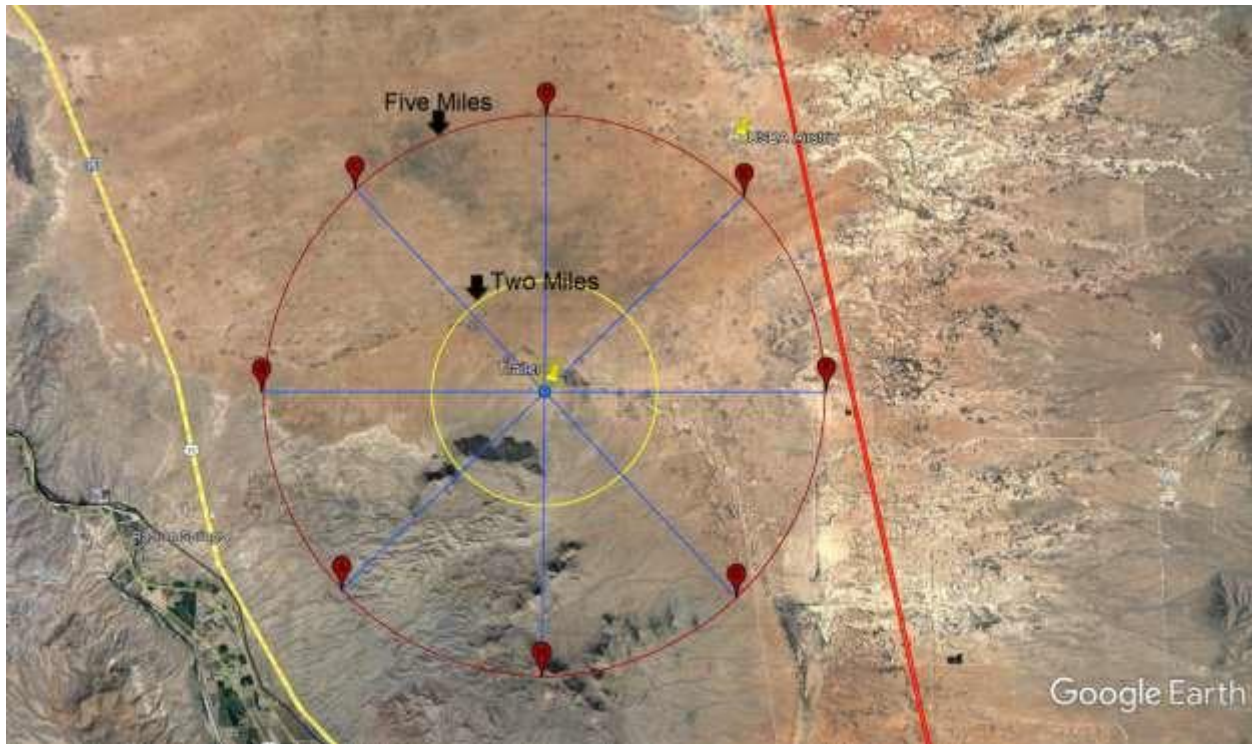


Figure 5. Crewed Aircraft Test Card 3 Operating Location.

Table 6. Crewed Aircraft Test Card 3 Flight Paths.

VO-M-500-3				
✓	Action	Remarks	Call	Time
1	H-X-B --- C			
2	C-X-E --- F			
3	F-X-H --- A			
4	A-X-C --- D			
5	D-X-F --- G			
6	G-X-A --- B			
7	B-X-D --- E			
8	E-X-G --- H			
9	H-X-F --- E			
10	E-X-C --- B			
11	B-X-H --- G			
12	G-X-E --- D			
13	D-X-B --- A			
14	A-X-G --- F			
15	F-X-D --- C			
16	C-X-A --- H			

Table 7. Crewed Aircraft Test Card 3.

Flight Card #	VO-M-500-3	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	500 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Crewed Test Card 4 – VO-M-700-4

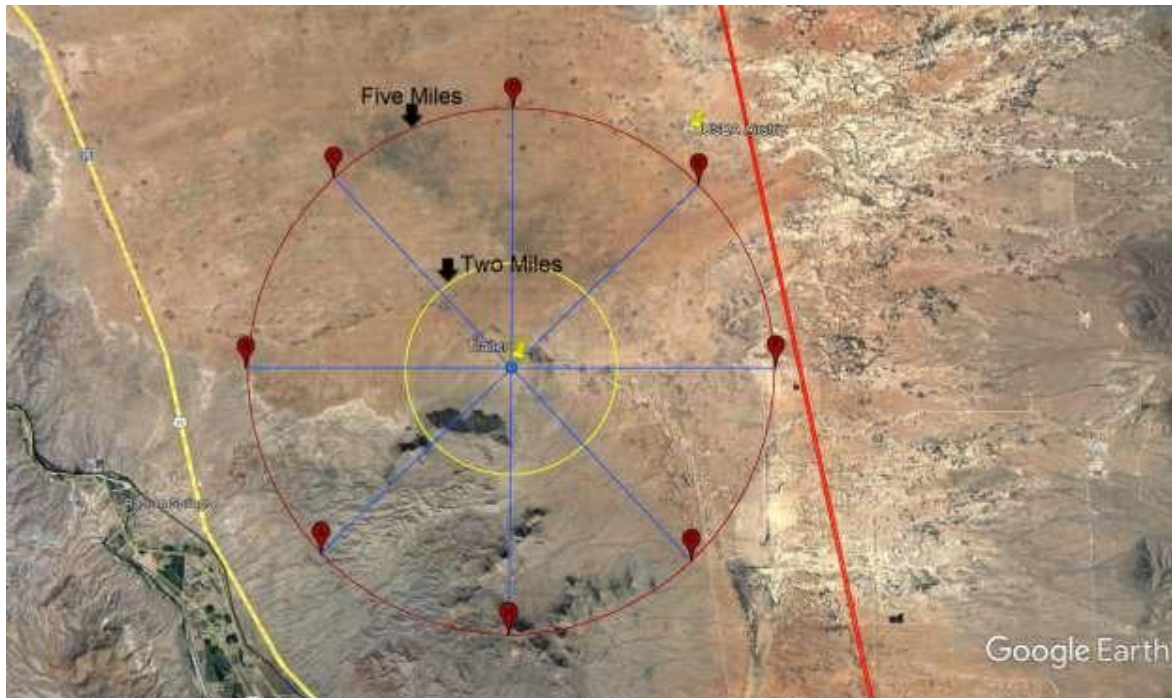


Figure 6. Crewed Aircraft Test Card 4 Operating Location.

Table 8. Crewed Aircraft Test Card 4 Flight Paths.

VO-M-700-4				
✓	Action	Remarks	Call	Time
1	A-X-E --- F			
2	F-X-B --- C			
3	C-X-G --- H			
4	H-X-D --- E			
5	E-X-A --- B			
6	B-X-F --- G			
7	G-X-C --- D			
8	D-X-H --- A			
9	A-X-D --- E			
10	E-X-H --- A			
11	A-X-F --- E			
12	E-X-B --- C			
13	C-X-H --- G			
14	G-X-B --- C			
15	C-X-F --- G			
16	G-X-D --- B			
17	B-X-E --- D			
18	D-X-A ---B			
19	B-X-G --- F			
20	F-X-C ---D			
21	D-X-G --- F			
22	F-X-A --- H			
23	H-X-C --- H			
24	H-X-E			

Table 9. Crewed Aircraft Test Card 4.

Flight Card #	VO-M-700-4	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Crewed Test Card 5 – VO-M-700-5

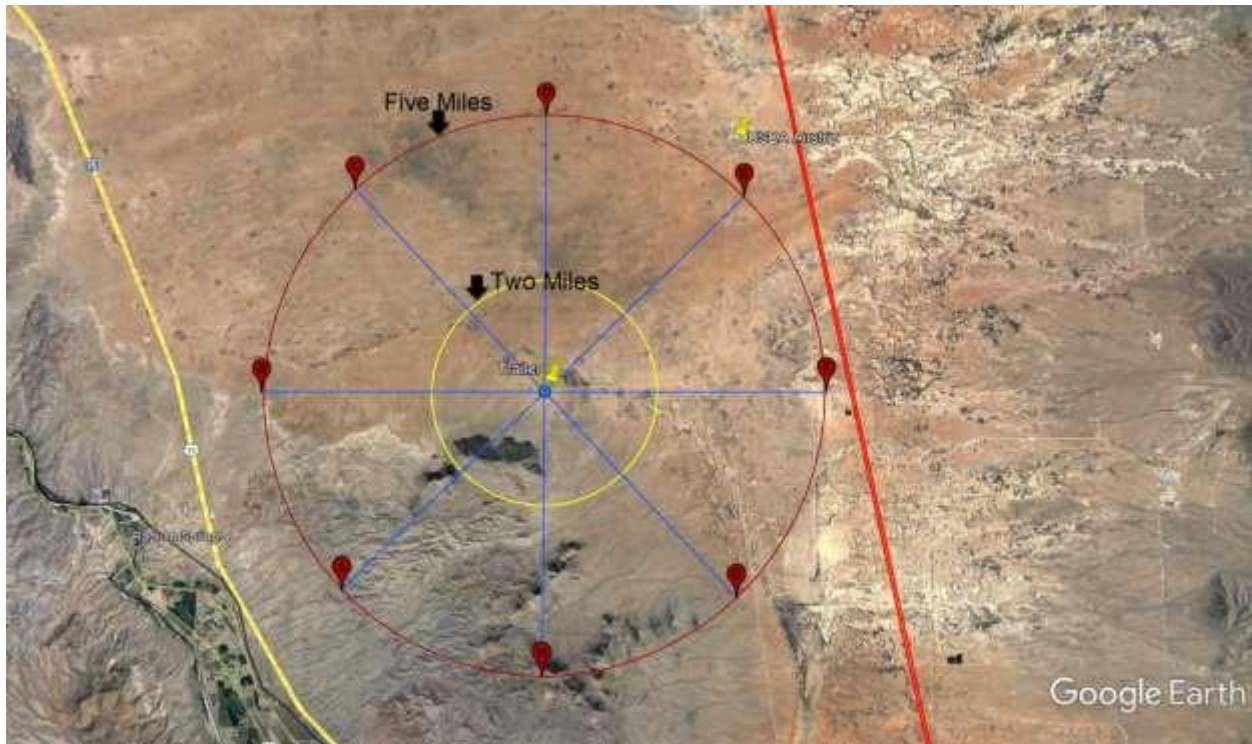


Figure 7. Crewed Aircraft Test Card 5 Operating Location.

Table 10. Crewed Aircraft Test Card 5 Flight Paths.

VO-M-700-5				
✓	Action	Remarks	Call	Time
1	A-X-H --- G			
2	G-X-F --- E			
3	E-X-D --- C			
4	C-X-B --- A			
5	H-X-G --- F			
6	F-X-E --- D			
7	D-X-C --- B			
8	B-X-A --- B			
9	B-X-C --- D			
10	D-X-E --- F			
11	F-X-G --- H			
12	H-X-A --- C			
13	C-X-D --- E			
14	E-X-F --- G			
15	G-X-H --- A			
16	A-X-B --- C			

Table 11. Crewed Aircraft Test Card 5.

Flight Card #	VO-M-700-5	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Crewed Test Card 6 – VO-M-700-6

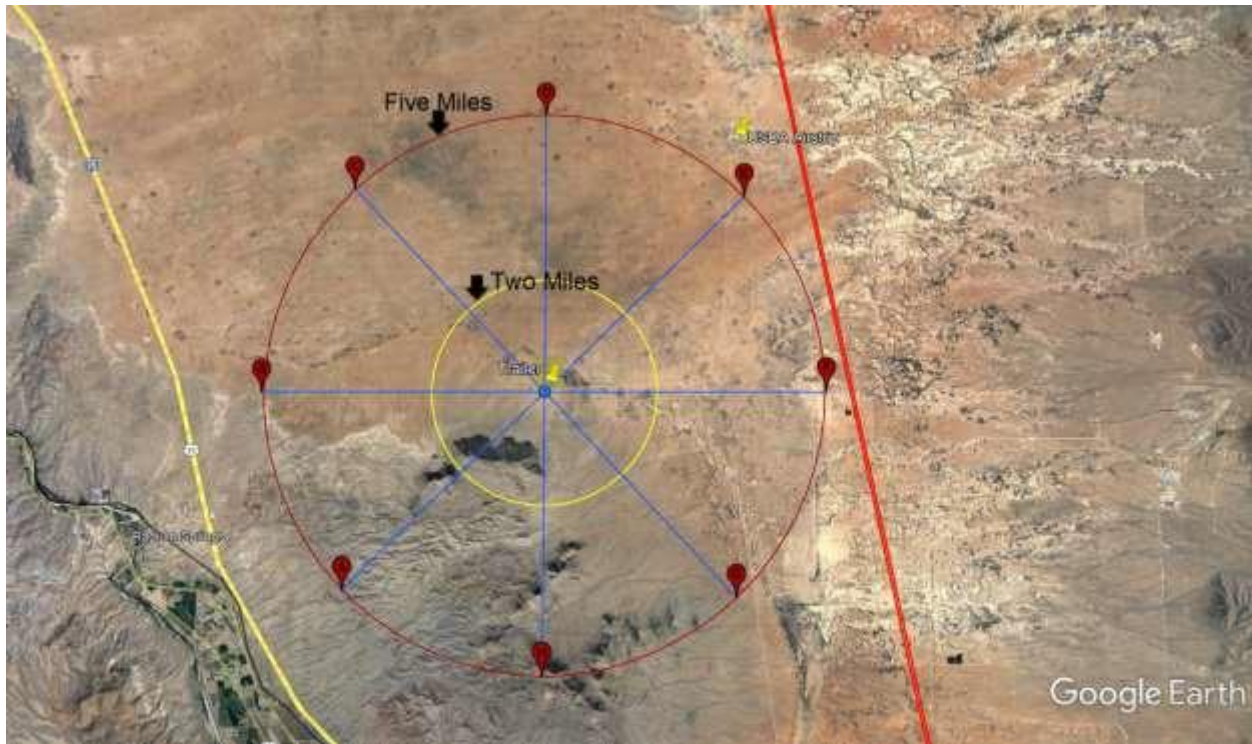


Figure 8. Crewed Aircraft Test Card 6 Operating Location.

Table 12. Crewed Aircraft Test Card 6 Flight Paths.

VO-M-700-6				
✓	Action	Remarks	Call	Time
1	H-X-B --- C			
2	C-X-E --- F			
3	F-X-H --- A			
4	A-X-C --- D			
5	D-X-F --- G			
6	G-X-A --- B			
7	B-X-D --- E			
8	E-X-G --- H			
9	H-X-F --- E			
10	E-X-C --- B			
11	B-X-H --- G			
12	G-X-E --- D			
13	D-X-B --- A			
14	A-X-G --- F			
15	F-X-D --- C			
16	C-X-A --- H			

Table 13. Crewed Aircraft Test Card 6.

Flight Card #	VO-M-700-6	<p>sUAS will fly a simulated mission.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform	simulated	
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft separation from the proposed sUAS operations. sUAS will transition from 200 ft to 400 ft altitude, where the crewed aircraft will mirror the altitude change.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 1 – VO-UM-Box200-1

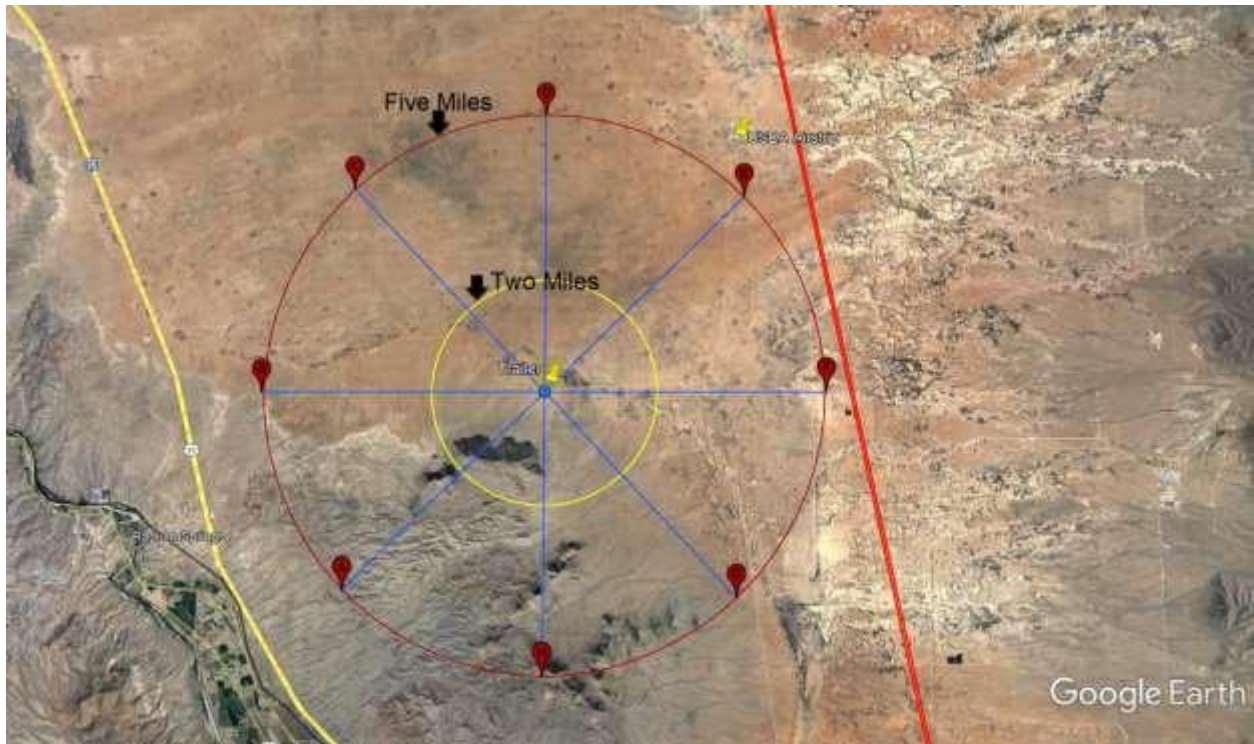


Figure 9. Uncrewed Aircraft Test Card 1 Operating Location.

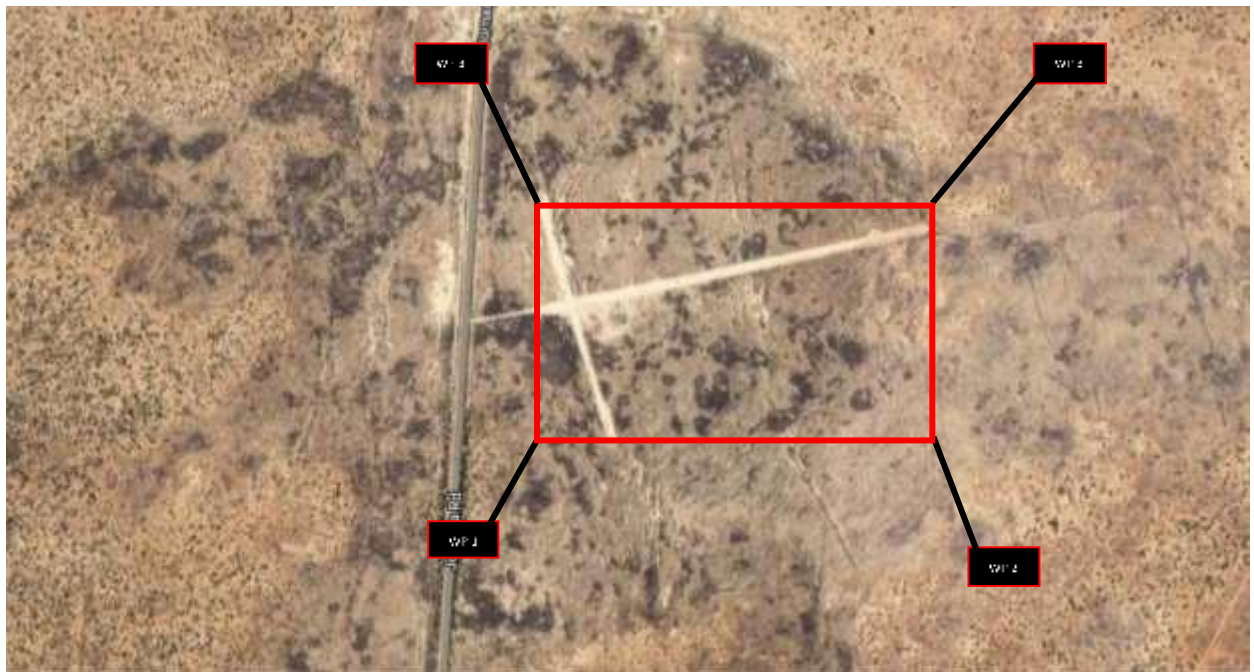


Figure 10. Zoomed in representative picture of Uncrewed Aircraft Test Card 1 Location.

Table 14. Uncrewed Aircraft Test Card 1 Flight Paths.

VO-UM-Box200-1					
✓		Action	Remarks	Call	Time
	1	WP 1 – WP 2			
	2	WP 2 – WP 2			
	3	WP 3 – WP 4			
	4	WP 4 – WP 1			
	5	WP 1 – WP 2			
	6	WP 2 – WP 2			
	7	WP 3 – WP 4			
	8	WP 4 – WP 1			
	9	WP 1 – WP 2			
	10	WP 2 – WP 2			
	11	WP 3 – WP 4			
	12	WP 4 – WP 1			
	13	WP 1 – WP 2			
	14	WP 2 – WP 2			
	15	WP 3 – WP 4			
	16	WP 4 – WP 1			

Table 15. Uncrewed Aircraft Test Card 1.

Flight Card #	VO-UM-Box200-1	sUAS will fly a simulated box mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.
Date/Time		
Objective	Primary: Intrude on Uncrewed airspace according to trajectories Secondary: Safe operations	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		Aircraft will then transition to the next starting point. sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations. “X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 2 – VO-UM-Box400-2

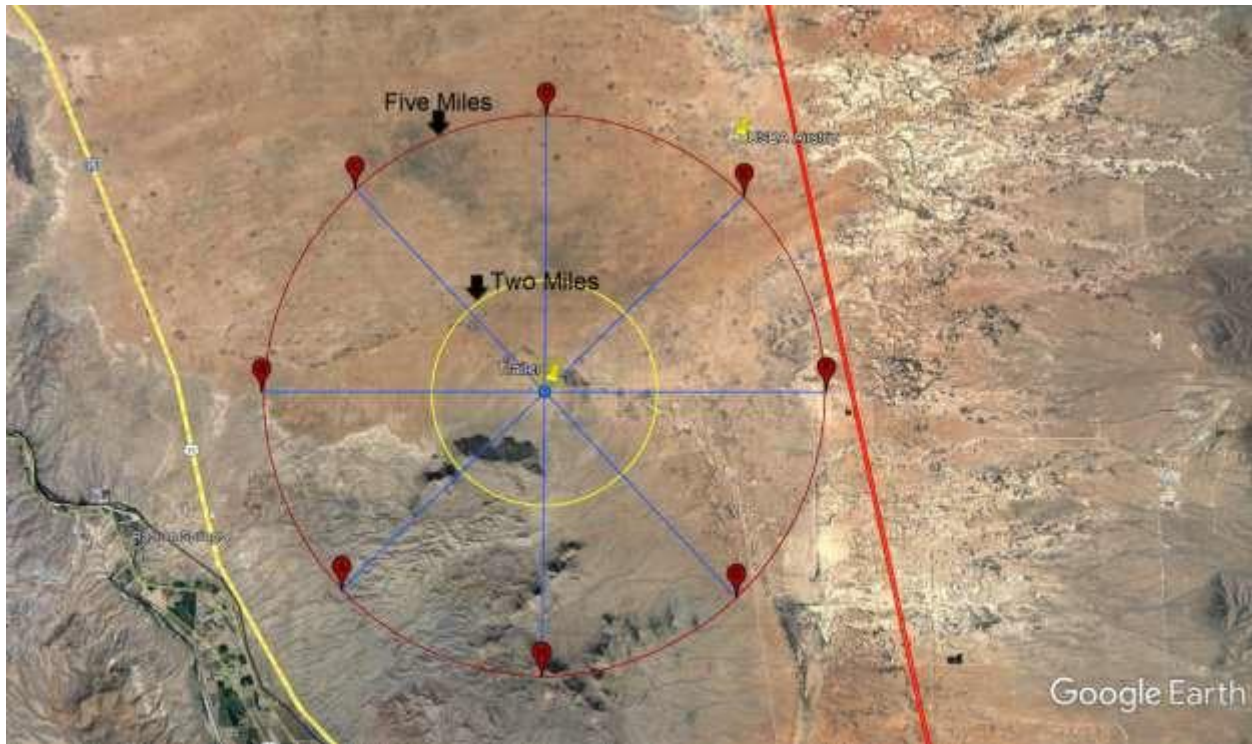


Figure 11. Uncrewed Aircraft Test Card 2 Operating Location.

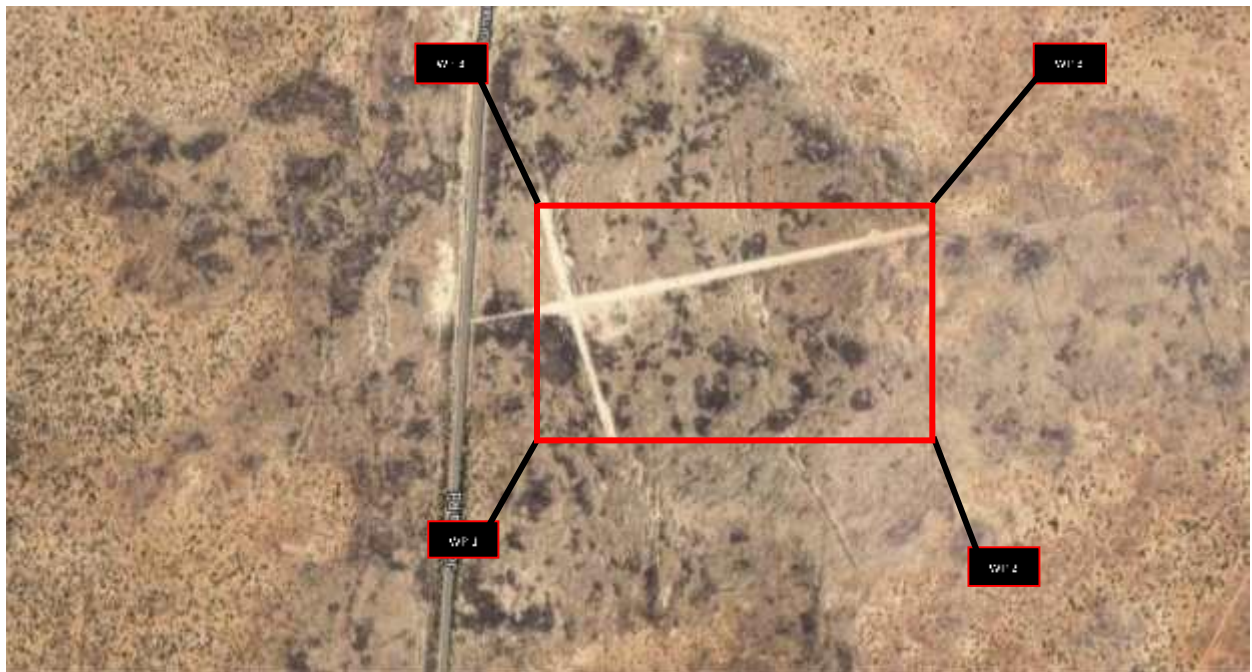


Figure 12. Zoomed in representative picture of Uncrewed Aircraft Test Card 2 Location.

Table 16. Uncrewed Aircraft Test Card 2 Flight Paths.

VO-UM-Box400-2					
✓		Action	Remarks	Call	Time
	1	WP 1 – WP 2			
	2	WP 2 – WP 2			
	3	WP 3 – WP 4			
	4	WP 4 – WP 1			
	5	WP 1 – WP 2			
	6	WP 2 – WP 2			
	7	WP 3 – WP 4			
	8	WP 4 – WP 1			
	9	WP 1 – WP 2			
	10	WP 2 – WP 2			
	11	WP 3 – WP 4			
	12	WP 4 – WP 1			
	13	WP 1 – WP 2			
	14	WP 2 – WP 2			
	15	WP 3 – WP 4			
	16	WP 4 – WP 1			

Table 17. Uncrewed Aircraft Test Card 2.

Flight Card #	VO-UM-Box400-2	sUAS will fly a simulated box mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.
Date/Time		
Objective	Primary: Intrude on Uncrewed airspace according to trajectories Secondary: Safe operations	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center "X" and then out to the next designated location. Aircraft will then transition to the next starting point. sUAS will repeat this until the mission commander dictates otherwise or when batteries need to be changed.
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		sUAS will stay at least 300 ft vertical separation from the intruder. Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations. "X" represents the center location of the test area "---" indicates aircraft will leave pattern and arch to next start point.
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 3 – VO-UM-Linear200-3

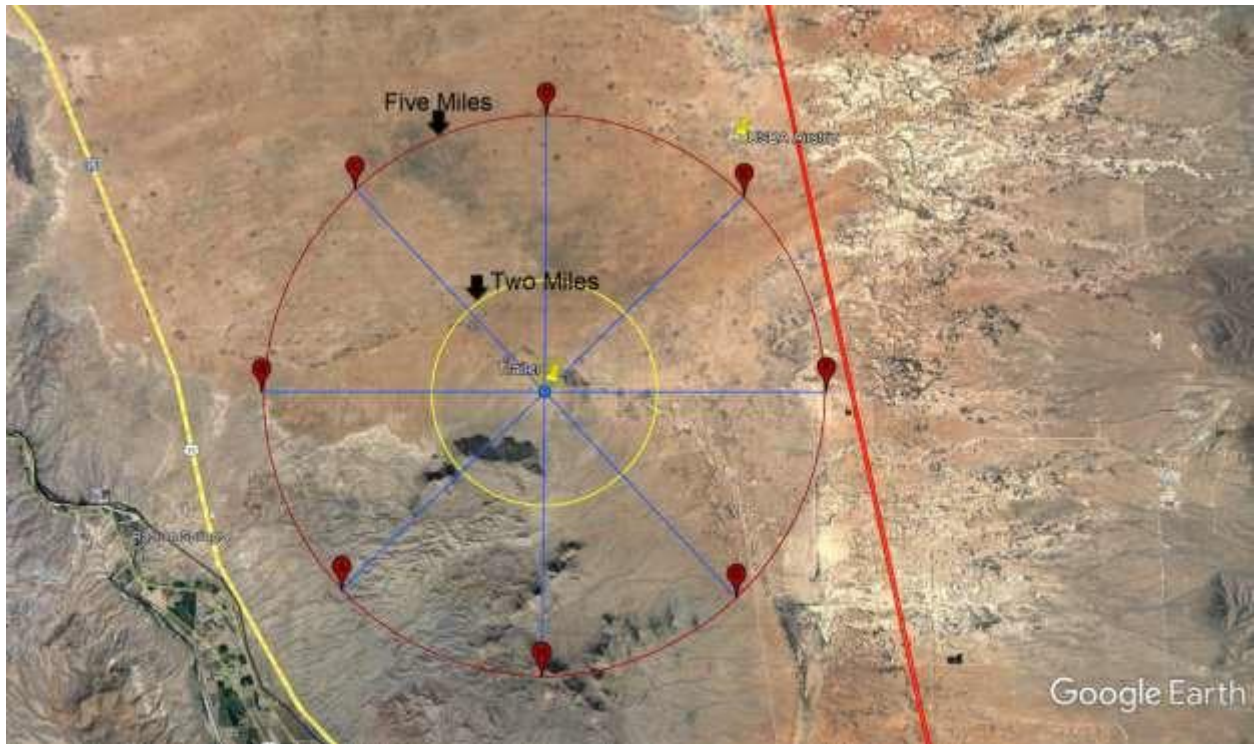


Figure 13. Uncrewed Aircraft Test Card 3 Operating Location.



Figure 14. Zoomed in representative picture of Uncrewed Aircraft Test Card 3 Location.

Table 18. Uncrewed Aircraft Test Card 3 Flight Paths.

VO-UM-Linear200-3					
✓		Action	Remarks	Call	Time
	1	Start point – end point			
	2	Start point – end point			
	3	Start point – end point			
	4	Start point – end point			
	5	Start point – end point			
	6	Start point – end point			
	7	Start point – end point			
	8	Start point – end point			
	9	Start point – end point			
	10	Start point – end point			
	11	Start point – end point			
	12	Start point – end point			
	13	Start point – end point			
	14	Start point – end point			
	15	Start point – end point			
	16	Start point – end point			

Table 19. Uncrewed Aircraft Test Card 3.

Flight Card #	VO-UM-Linear200-3	<p>sUAS will fly a simulated linear inspection mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p> <p>sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.</p> <p>sUAS will stay at least 300 ft vertical separation from the intruder.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	<p>Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations.</p> <p>“X” represents the center location of the test area</p> <p>“---” indicates aircraft will leave pattern and arch to next start point.</p>
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 4 – VO-UM-Linear400-4

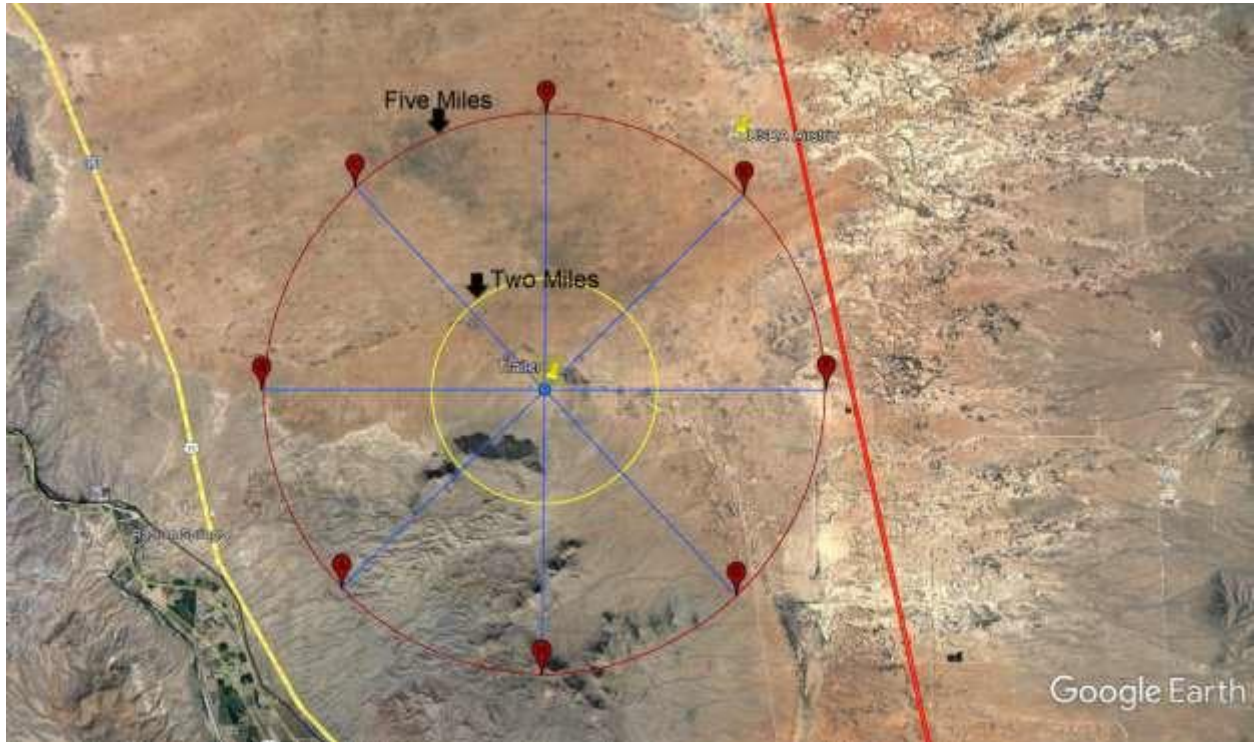


Figure 15. Uncrewed Aircraft Test Card 4 Operating Location.



Figure 16. Zoomed in representative picture of Uncrewed Aircraft Test Card 1 Location.

Table 20. Uncrewed Aircraft Test Card 4 Flight Paths.

VO-UM-Linear400-4					
✓		Action	Remarks	Call	Time
	1	Start point – end point			
	2	Start point – end point			
	3	Start point – end point			
	4	Start point – end point			
	5	Start point – end point			
	6	Start point – end point			
	7	Start point – end point			
	8	Start point – end point			
	9	Start point – end point			
	10	Start point – end point			
	11	Start point – end point			
	12	Start point – end point			
	13	Start point – end point			
	14	Start point – end point			
	15	Start point – end point			
	16	Start point – end point			

Table 21. Uncrewed Aircraft Test Card 4.

Flight Card #	VO-UM-Linear400-4	<p>sUAS will fly a simulated linear inspection mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p> <p>sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.</p> <p>sUAS will stay at least 300 ft vertical separation from the intruder.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	<p>Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations.</p> <p>“X” represents the center location of the test area</p> <p>“---” indicates aircraft will leave pattern and arch to next start point.</p>
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 5 – VO-UM-Map200-5

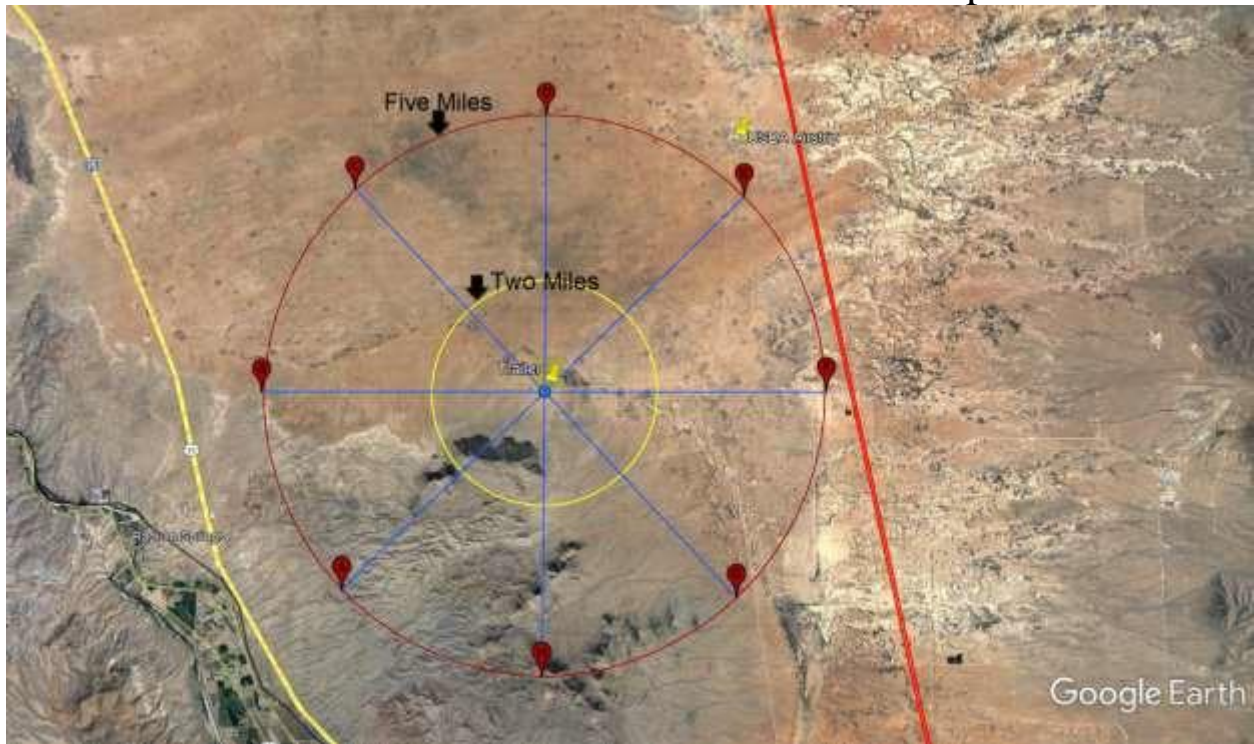


Figure 17. Uncrewed Aircraft Test Card 5 Operating Location.



Figure 18. Zoomed in representative picture of Uncrewed Aircraft Test Card 5 Location.

Table 22. Uncrewed Aircraft Test Card 5 Flight Paths.

VO-UM-Map200-5					
✓		Action	Remarks	Call	Time
	1	WP 1 – WP 2			
	2	WP 2 – WP 3			
	3	WP 3 – WP 4			
	4	WP 4 – WP 5			
	5	WP 5 – WP 6			
	6	WP 6 – WP 7			
	7	WP 7 – WP 8			
	8	WP 8 – WP 9			
	9	WP 9 – WP 10			
	10	WP 10 – WP 11			
	11	WP 11 – WP 12			
	12	WP 12 – WP 13			
	13	WP 12 – WP 13			
	14	WP 13 – WP 14			
	15	WP 14 – WP 15			
	16	WP 15 – WP 16			

Table 23. Uncrewed Aircraft Test Card 5.

Flight Card #	VO-UM-Map200-5	<p>sUAS will fly a simulated mapping inspection mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p> <p>sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.</p> <p>sUAS will stay at least 300 ft vertical separation from the intruder.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	<p>Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations.</p> <p>“X” represents the center location of the test area</p> <p>“---” indicates aircraft will leave pattern and arch to next start point.</p>
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 5 – VO-UM-Map400-6

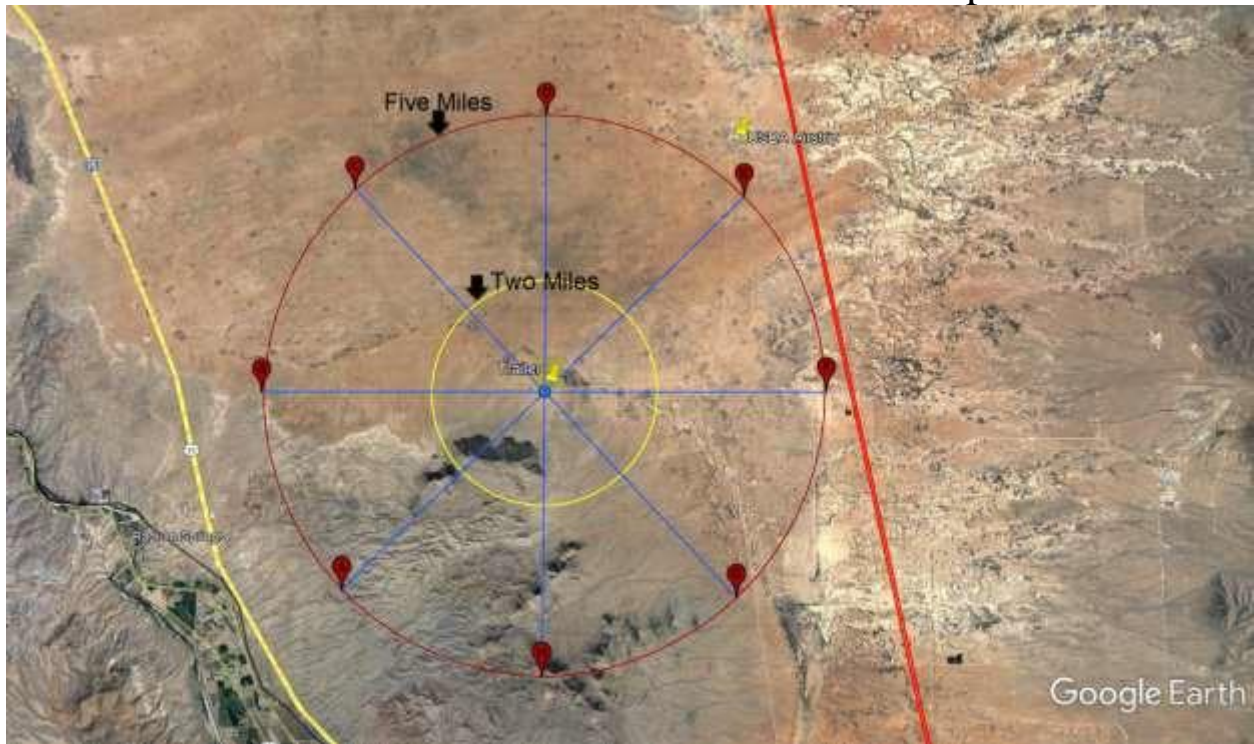


Figure 19. Uncrewed Aircraft Test Card 6 Operating Location.



Figure 20. Zoomed in representative picture of Uncrewed Aircraft Test Card 6 Location.

Table 24. Uncrewed Aircraft Test Card 6 Flight Paths.

VO-UM-Map400-6					
✓		Action	Remarks	Call	Time
	1	WP 1 – WP 2			
	2	WP 2 – WP 3			
	3	WP 3 – WP 4			
	4	WP 4 – WP 5			
	5	WP 5 – WP 6			
	6	WP 6 – WP 7			
	7	WP 7 – WP 8			
	8	WP 8 – WP 9			
	9	WP 9 – WP 10			
	10	WP 10 – WP 11			
	11	WP 11 – WP 12			
	12	WP 12 – WP 13			
	13	WP 12 – WP 13			
	14	WP 13 – WP 14			
	15	WP 14 – WP 15			
	16	WP 15 – WP 16			

Table 25. Uncrewed Aircraft Test Card 6 Flight Paths.

Flight Card #	VO-UM-Map400-6	<p>sUAS will fly a simulated mapping inspection mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p> <p>sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.</p> <p>sUAS will stay at least 300 ft vertical separation from the intruder.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	<p>Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations.</p> <p>“X” represents the center location of the test area</p> <p>“---” indicates aircraft will leave pattern and arch to next start point.</p>
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 7 – VO-UM-Orbit200-7

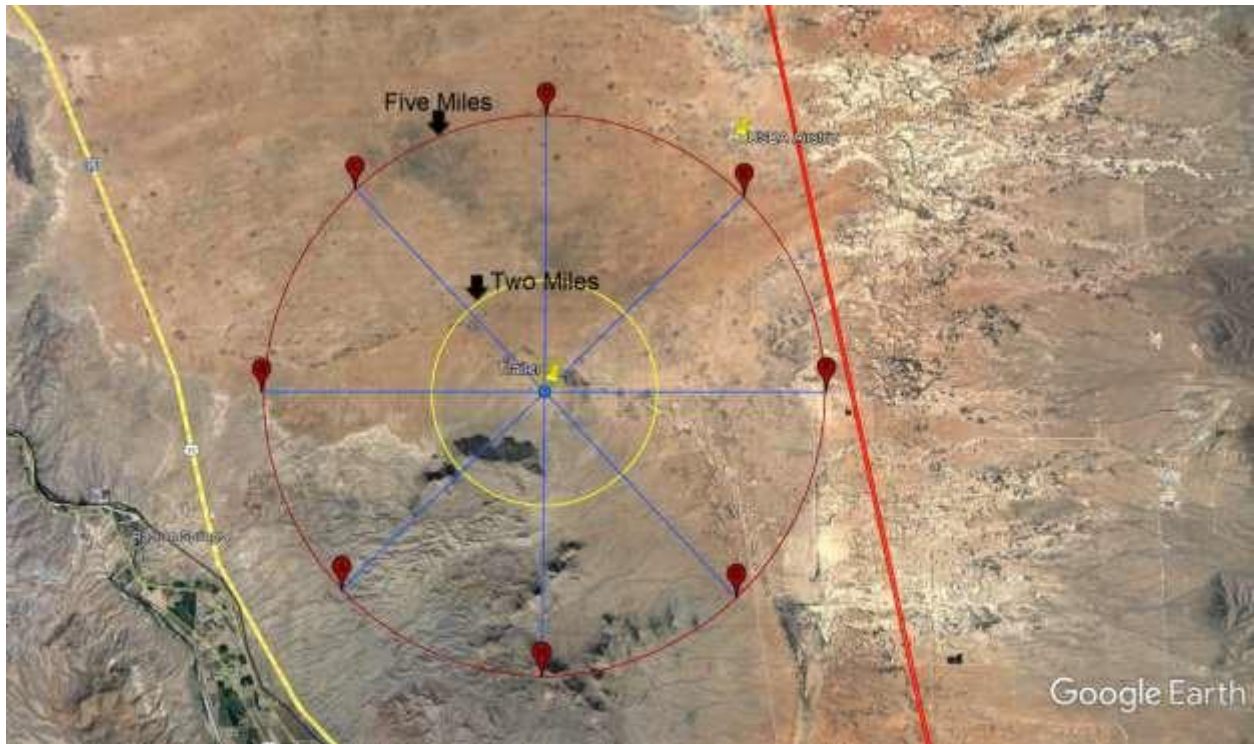


Figure 21. Uncrewed Aircraft Test Card 7 Operating Location.



Figure 22. Zoomed in representative picture of Uncrewed Aircraft Test Card 7 Location.

Table 26. Uncrewed Aircraft Test Card 7 Flight Paths.

VO-UM-Orbit200-7					
✓		Action	Remarks	Call	Time
	1	Start point – end point			
	2	Start point – end point			
	3	Start point – end point			
	4	Start point – end point			
	5	Start point – end point			
	6	Start point – end point			
	7	Start point – end point			
	8	Start point – end point			
	9	Start point – end point			
	10	Start point – end point			
	11	Start point – end point			
	12	Start point – end point			
	13	Start point – end point			
	14	Start point – end point			
	15	Start point – end point			
	16	Start point – end point			

Table 27. Uncrewed Aircraft Test Card 7.

Flight Card #	VO-UM-Orbit200-7	<p>sUAS will fly a simulated orbit mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.</p> <p>Intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories to the center “X” and then out to the next designated location.</p> <p>Aircraft will then transition to the next starting point.</p> <p>sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.</p> <p>sUAS will stay at least 300 ft vertical separation from the intruder.</p>
Date/Time		
Objective	<p>Primary: Intrude on Uncrewed airspace according to trajectories</p> <p>Secondary: Safe operations</p>	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		
UAS Altitude	200 ft	
UAS Speed	17 mph – 15 kts	
Intruder		<p>Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations.</p> <p>“X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.</p>
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		

A46 VO Uncrewed Test Card 8 – VO-UM-Orbit400-8

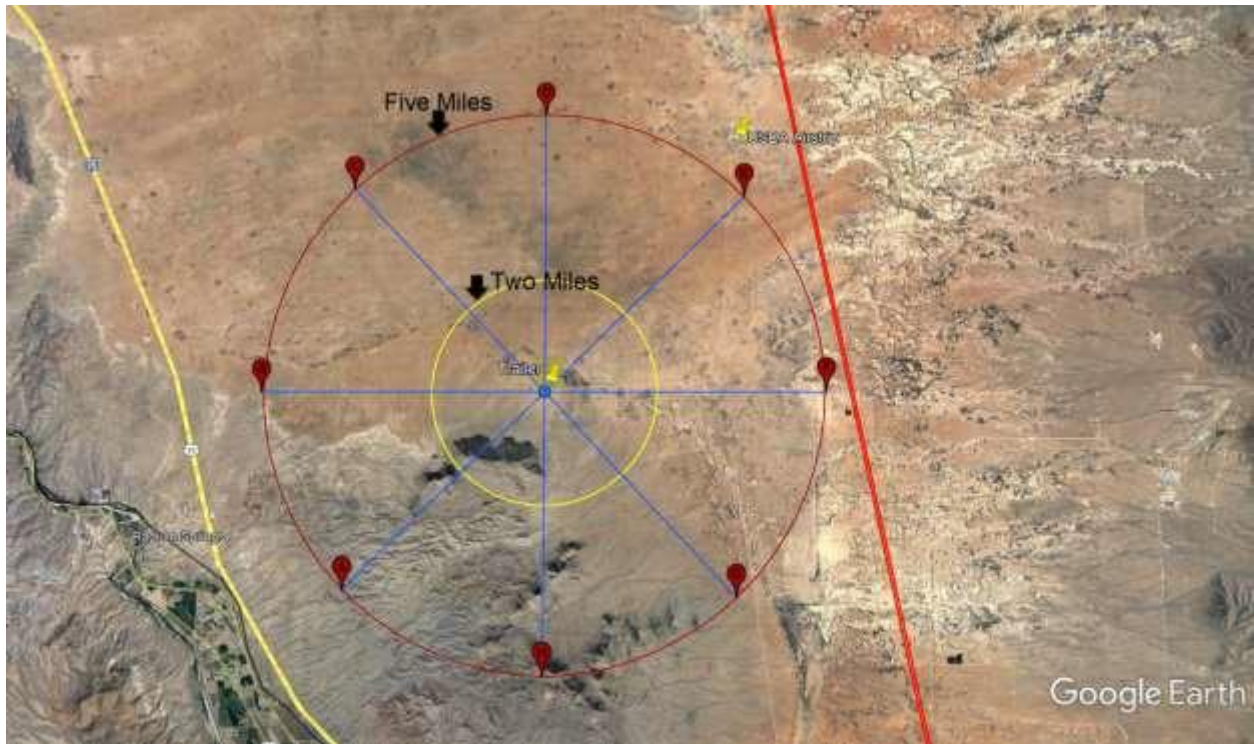


Figure 23. Uncrewed Aircraft Test Card 8 Operating Location.



Figure 24. Zoomed in representative picture of Uncrewed Aircraft Test Card 8 Location.

Table 28. Uncrewed Aircraft Test Card 8 Flight Paths.

VO-UM-Orbit400-8					
✓		Action	Remarks	Call	Time
	1	Start point – end point			
	2	Start point – end point			
	3	Start point – end point			
	4	Start point – end point			
	5	Start point – end point			
	6	Start point – end point			
	7	Start point – end point			
	8	Start point – end point			
	9	Start point – end point			
	10	Start point – end point			
	11	Start point – end point			
	12	Start point – end point			
	13	Start point – end point			
	14	Start point – end point			
	15	Start point – end point			
	16	Start point – end point			

Table 29. Uncrewed Aircraft Test Card 8.

Flight Card #	VO-UM-Orbit400-8	sUAS will fly a simulated orbit mission. An intruder aircraft will fly into the sUAS airspace from one of the compass rose trajectories.
Date/Time		
Objective	Primary: Intrude on Uncrewed airspace according to trajectories Secondary: Safe operations	
Description	Crewed Aircraft will fly in spontaneous flight trajectories at different variables while the test VO will look for intruder aircraft.	
UAS Platform		Aircraft will then transition to the next starting point. sUAS will repeat this until mission commander dictates otherwise or when batteries need to be changed.
UAS Altitude	400 ft	
UAS Speed	17 mph – 15 kts	
Intruder		Crewed aircraft will maintain at least a 300 ft vertical separation from the proposed sUAS operations. “X” represents the center location of the test area “---” indicates aircraft will leave pattern and arch to next start point.
Intruder Altitude	700 ft	
Intruder Speed	100 kts	
Location	NMSU College Ranch Test Range / Las Cruces Airport	
GCS		
Supporting Technology		
Intruder PIC		
Intruder VO		
UAS PIC		
UAS test VO		