

## APPENDIX O

### WEATHER AND ENVIRONMENTAL ELEMENTS AND PARAMETERS IMPACTING ARMY SYSTEMS AND OPERATIONS

The data elements and parameters listed in this appendix are from a study conducted by the US Army Intelligence School as part of the IEW Mission Area Analysis (IEWMAA). Each TRADOC branch was asked to survey the impact of weather and environmental elements on their operations, systems, and personnel. They ranked these impacts as either essential (E) or desired (D). Other Army agencies also submitted their weather data element requirements which are incorporated here.

To be listed as E, some positive action had to be taken by the user based on severe current or forecasted weather conditions. Weather conditions, elements, or parameters listed as D were identified as having some impact, but the degree of impact is uncertain or not mission-threatening.

Note that for each element or parameter listed, at least one responder identified it as essential for one or more of their operations, systems, or personnel.

Some data elements and parameters are known to have an impact, but exact critical thresholds have not been determined. Others cannot be measured or sensed with present technology. But identifying these data elements or parameters now allows for further research in how to collect the raw data (where applicable), determine the frequency of collection, establish data accuracy, and learn other supporting information.

Just prior to this printing, 10 of the 24 agencies stating requirements submitted updates to their original needs. Ninety two new essential requirements and 22 new desired requirements were added. Additionally, 9 desired requirements were upgraded to essential, and 11 essential requirements were downgraded to desirable. Four existing requirements were deleted.

These updated data requirements are reflected in Figure O-1. As users and planners continue to learn more about weather and environmental impacts, the misconception there is such a hypothetical thing as an Army "all-weather" system or operation fades. New values and impacts will be added to this manual as the information becomes available.

WEATHER AND ENVIRONMENTAL DATA ELEMENTS IMPACTING ARMY SYSTEMS/OPERATIONS																									
A = AIR DEFENSE B = ADJUTANT GENERAL C = ARMOR D = AVIATION E = CHAPLAIN F = DEFENSE AMMUNITION CENTER G = ENGINEER H = FIELD ARTILLERY									I = FINANCE J = HEALTH SERVICES K = INTELLIGENCE L = INFANTRY M = JUDGE ADVOCATE N = MILITARY POLICE O = CHEMICAL P = ORDNANCE									Q = ORDNANCE M&M R = PUBLIC AFFAIRS S = QUARTERMASTER T = SIGNAL U = SPECIAL FORCES V = SOLDIER SUPPORT W = TRANSPORTATION X = JOINT READINESS TRNG CENTER							
REQUIREMENT DESIGNATORS: E = ESSENTIAL SUPPORT NEEDS D = DESIRABLE SUPPORT NEEDS																									
SPECIAL GROUP CATEGORIES: [GS] = GROUND STATE [SS] = SEA STATE [SW] = SEVERE WEATHER CRITERIA																									
DATA ELEMENT	CATEGORY	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1. ALTIMETER SETTING					E						E	E											E		
2. ATMOSPHERIC CONTAMINANTS					E	D	D	E	D		E	E								D			D		
3. ATMOSPHERIC DENSITY										E		E											E		
4. ATMOS. TRANSMISSION COEFFICIENT										E															
5. BAROMETRIC PRESSURE		D		E	E					E	E	E											E		E
6. CLOUD COVER AMOUNT		D		E	E		E	E	E		E	E	E		D	E				D			D	E	E
7. CLOUD BASE HEIGHT		E			E		E	E	E		E	E	E		D	E							E		E
8. CLOUD TOP HEIGHT					E						E	E											D		
9. DAMAGING WINDS [SW]		E	E	E	E	E	D	E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
10. DENSITY ALTITUDE					E						E	E											E		E
11. EXTINCTION COEFFICIENT										E		E											D		
12. EXTREME HEAT/COLD [SW]		E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
13. FLOODING, RIVER STAGE [GS]		E	E	E	E	E		E	D	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
14. FREEZE/THAW DEPTH [GS]		D		E	E			E	D		E	E	E		E	D	E	E		E	E	D			E
15. FREEZING PRECIPITATION [SW]		E	E	E	E	E		E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
16. HEAVY RAIN/SNOW [SW]		E	E	E	E	E	D	E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
17. HUMIDITY, ABSOLUTE		D			E				E		E	E					E						E		E
18. HUMIDITY, ABSOLUTE, PROFILE		D			E				E		E	E					E						E		E
19. HUMIDITY, RELATIVE						E	E	D		E	E						E				E	D	E	E	E
20. HUMIDITY, RELATIVE, PROFILE									E														D		
21. HURRICANES/TYPHOONS [SW]		E	E	E	E	E		E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
22. ICE/SNOW DEPTH/COVER [GS]		D		E	E			E	D		E	E	E		E	D	D	E		E	E	D			E
23. ICING, FLIGHT [SW]					E						E	E	E										E		E
24. ILLUMINATION		E		E	E			E	E		E	E	E		E	D				D			E	E	E
25. IR TARGET/BACKGROUND CONTRAST				E	E				D		E	D											E		E
26. IR THERMAL CONTRAST X-OVER TIME				E	E				D		E	E											E		E
27. IONOSPHERIC DISTURBANCES					D						D	E											E	E	
28. LIGHT DATA		E		E	E		D	E	D		E	E	E		D	D						D	D	E	D
29. LIGHTNING/THUNDERSTORMS [SW]					D		E	E	E		D	E										E	E		E
30. LITTORAL CURRENT [SS]					D		D	E			D	D	E										E		
31. PRECIPITATION, ACCUMULATION		D	E	E	D	D	E	D	D	E	E	E			E	D	E			D	E	E	E	E	D

Figure O-1. Weather and environmental data elements impacting Army systems and operations.

DATA ELEMENT	CATEGORY	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
32. PRECIPITATION, RATE		E	D	E	D	E	E	D	E	E	E	D	E	E	D	E	E	D	D	E	E	E	E	E	E
33. PRECIPITATION, HAIL SIZE		E		E		E	D	E	E			E	E		E	E			E		D				
34. PRECIPITATION, TYPE		E	D	E	E	D	E	E	D	E	E	E	D	E	E	D			D	E	E	E	E	E	E
35. PRESSURE ALTITUDE				E						E	E	E										E			E
36. REFRACTIVE INDEX		E		E	E			D		E	E				D										
37. RESTRICTION TO VISIBILITY				E			E	D		D	E				E	E				E	E	E			E
38. SEEABILITY (MILLIMETER WAVE, INFRARED, ULTRAVIOLET)		E		E	E			E	E	E	E	E	E	E	E	D						E		E	D
39. SEVERE WEATHER CONDITIONS [SW]		E	E	E	E	E		E	E	E	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
40. SNOW STATE CONDITION [GS]		D		E	E			E	E		E	E	E	E	E	D	D	E		E	E	D			E
41. SNOW DRIFT DEPTH [GS]		D		D			E	D		D	E	E	E	E	E	E				D	E	E			E
42. SOIL/GROUND MOISTURE [GS]		D		E	E		D	E	D		E	E	E	E	E	D	D	E		D	E	D			E
43. SOIL/GROUND TEMPERATURE [GS]		D		E	E		D	E	D		E	E	E	E	E	E	E		D	D		E	E	E	E
44. SOLAR RADIATION						E					D	D										E			
45. STABILITY INDEX						E					E					E									E
46. STANDING WATER/POOLING [GS]		D		E	E	D		E	D		E	E	E	E	E	D	D	E	D	E	E	D			E
47. STATIC ELECTRICITY POTENTIAL				E							E	E													
48. SURF HEIGHT [SS]				D		E					D	D	E									E		E	E
49. SWELL DIRECTION/HEIGHT [SS]				D							D	D	E									E		E	E
50. TEMPERATURE, AIR, SURFACE		E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	D	E		D	E	E	E	E
51. TEMPERATURE, AIR, PROFILE				E		E		E		E	E	E										D			
52. TEMPERATURE, AIR, UPPER AIR				E				E		E	E	E										D			E
53. TEMPERATURE, DEWPOINT				E				D		E	E	E										E			E
54. TEMPERATURE, DEWPOINT, PROFILE				E				E		E	E	E										D			
55. TEMPERATURE, WINDCHILL FACTOR		D		D	D		E	D	D	E	E	E	D	E	E	E		D	E		E	E	E	E	E
56. TEMPERATURE, INVERSION LEVEL(S)				E		E		E		E	E	E				E						D			E
57. TEMPERATURE, SEA SURFACE [SS]				D		E					D	D	E									E		E	E
58. TEMPERATURE, WATER, INLAND [GS]				D		E					D	E	E									E		E	E
59. TEMPERATURE, WBGT				D		E	D		E	E					E	E	E			E	E				E
60. TORNADO [SW]		E	E	E	E	E		E	E	E	E	E		E	E	E	D	E	E	E	E	E	E	E	E
61. TURBULENCE, FLIGHT				E							E	E										E			
62. TURBULENCE, OPTICAL				E	E			E	E		E	D										E			
63. VISIBILITY, VISIBLE SPECTRUM, ALOFT				E				E															E		E
64. VISIBILITY, VISIBLE SPECTRUM, SFC		E		E				E	E		E	E	E	E	E	D			E		E	E	E	E	E
65. WAVE PERIODICITY [SS]				D							D	D	E									E		E	E
66. WAVE DIRECTION/HEIGHT [SS]				D							D	D	E									E		E	E
67. WIND, PROFILE				E				E		E	E	E										E			
68. WIND, PROFILE, TARGET, AGL - 3KM				E				E								E									
69. WIND, SHEAR				E							E	E										E			E
70. WIND, SURFACE, SPEED/DIRECTION		E		E	E		E	E	E		E	E	E	E	E	E	D	E	D	D	E	E	E	E	D
71. WIND, SURFACE, GUST SPEED				E			D	E	E		E	E	E	E	D							E	E		E
72. WIND, SURFACE, GUST SPREAD				E				E		E	E	E										E			E
73. WIND, UPPER AIR, SPEED/DIRECTION		E		E				E		E	E	E				E						E			E

Figure O-1. Weather and environmental data elements impacting Army systems and operations (continued).