

Appendix B

Biological Agents

Potential biological warfare agents and their effects are depicted in Table B-1 below.

Table B-1. Potential Biological Warfare Agents.

PATHOGENS	MOSTS LIKELY METHOD(S) OF DISSEMINATION	INCUBATION PERIOD (DAYS) ²	MORTALITY RATES ²	VACCINE ³	TREATMENT ⁴
Bacteria					
Bacillus Anthracis (Anthrax) ⁵	A	1-5	High	+ +	E ⁶
Francisella Tularensis (Tularemia)	A	1-10	Low	+ +	E ⁶
Yersinia Pestis (Plague) ⁷	A, V	2-5	High	+ + +	E ⁶
Vibrio Cholerae (Cholera)	I, A	1-5	High	+ + +	E
Salmonella Typhi (Typhoid Fever)	I, A	7-21	Moderate	+ + +	E
Rickettsiae					
Rickettsia SPP (Spotted Fevers Group)	A, V	6-15	Low Moderate	+ + +	E
Rickettsia (Endemic or Flea Borne Typhus)	A, V	4-15	Low	-	E
Rickettsia (Rocky Mountain Spotted Fever)	A, V	3-10	Low/Moderate	-	E
Coxiella Burnetii (Q Fever)	A, V	7-21	Very Low	+	N
Viruses					
Eastern Equine Encephalitis (EEE) ⁸	A, V	5-15	Moderate/High	-	N
Venezuelan Equine Encephalitis (VEE) ⁸	A, V	2-5	Moderate/High	+	E
Japanese B Encephalitis	A, V	5-15	Low*	+ +	N
Russian Spring-Summer Encephalitis (RSSE)	A, V (Tick)	7-14	Low/Moderate	+	N
Yellow Fever	A, V (Mosquito)	4-5	Low/Moderate	+ + +	N
Dengue Fever	A, V (Mosquito)	5-6	Low	-	N
Variola Virus (Smallpox)	A, D	11-13	High	+ + +	N
Hantaan Virus (Hemorrhagic Fever with/renal Syndrome)	A, V		Low	+	N
Phlebovirus (Rift Valley Fever)	A, V (Mosquito)	4-6	Low	+	N
* Nairovirus (Crimean-Congo Hemorrhagic Fever)	A, V (Tick)	3-7	Moderate	-	N*
Phlebovirus (Sandfly)	A, V (Mosquito)	3-6	Low	-	N
Alphavirus (Chikungunya)	A, V	2-6	Low	+	N
* Arenavirus (Lassa Fever)	A		High	-	N*
Filovirus (Ebola Fever)	A			-	N

Table B-1. Potential Biological Warfare Agents (Continued).

* Ribavirin shown to have experimental effectiveness.

1. Transmission can be by aerosol - A, direct contact -D, ingestion-I, and vector-V.
2. Incubation periods and mortality rates vary according to a number of factors (e.g., ability of the host to resist infection, infective dose, portal of entry, and virulence of the microorganism).
3. + indicates vaccine available but of questionable value; ++ indicates vaccine available but mainly used in high risk individuals; +++ indicates vaccine used extensively; - indicates no vaccine available.
4. E indicates effective treatment available; N indicates no specific treatment.
5. The mortality rate is lower due to skin form; mortality rate higher due to respiratory form.
6. Treatment must be initiated in the earliest stage of the pulmonary form to be effective.
7. Includes both bubonic and pneumonic forms.
8. Mosquitoes are thought to be the primary vectors, but this has not been proved.

Mortality rates for untreated/exposed personnel.

High = 50% or greater
 Moderate = 15 - 50%
 Low = >1 - 15%

TABLE B-2. Lethality and Rate of Action of Selected Toxins.

TOXIN AND TIME TO TOXIC EFFECTS	TOXICITY *	TYPE AND EFFECTS
* In mice if no other information is given.		
Very rapid: 5 minutes		
Anatoxin A (VFDF)	+	Lethal paralytic neurotoxin; chemical nerve agent symptoms.
Conotoxin	++	Lethal snail neurotoxin; bleeding at injection site; muscle weakness.
Palytoxin	+++	Lethal neurotoxin; muscle paralysis; collapse.
Rapid: 5 minutes to 1 hour		
Diphtheria toxin	++++	Lethal; sore throat; swollen glands.
Batrachotoxin	++++	Lethal; frog paralytic neurotoxin; neuromuscular block.
Ricin (injected)	+++	Lethal cytotoxin.
Taipoxin	+++	Lethal; snake paralytic neurotoxin.
Saxitoxin	+++	Lethal; numbness; muscle weakness; incoordination respiratory distress.
Tetrodotoxin	+++	Lethal neuromuscular block; numbness; loss of muscle control; voice loss.
Alpha-latrotoxin	++	Lethal spider neurotoxin; paralytic chemical agent symptoms.
Notoxin	++	Lethal snake neurotoxin; paralytic.
Beta-bungarotoxin	++	Lethal snake neurotoxin; paralytic.
Cobrotoxin	++	Lethal snake neurotoxin; paralytic.
Microcystin (FDF)	+	Lethal cytotoxin; shivering; stupor.
Delayed: 1 to 12 hours		
Ricin (aerosol, skin, oral)	+++	Lethal cytotoxin; nausea; vomiting; cramps.
Staphylococcus enterotoxin B	++	Incapacitant; acute food poisoning symptoms.
Botulinum (oral)	+++	Lethal neurotoxin; drooping eyelids; double vision; dilated pupils; fever; paralysis.
T-2 (skin, aerosol, oral)	+	Incapacitant/lethal cytotoxin; skin reddening, rash, blisters; nausea; bloody vomit, diarrhea.
* extremely toxic, + + + +; very toxic, + + +; moderately toxic, + +; toxic, +		

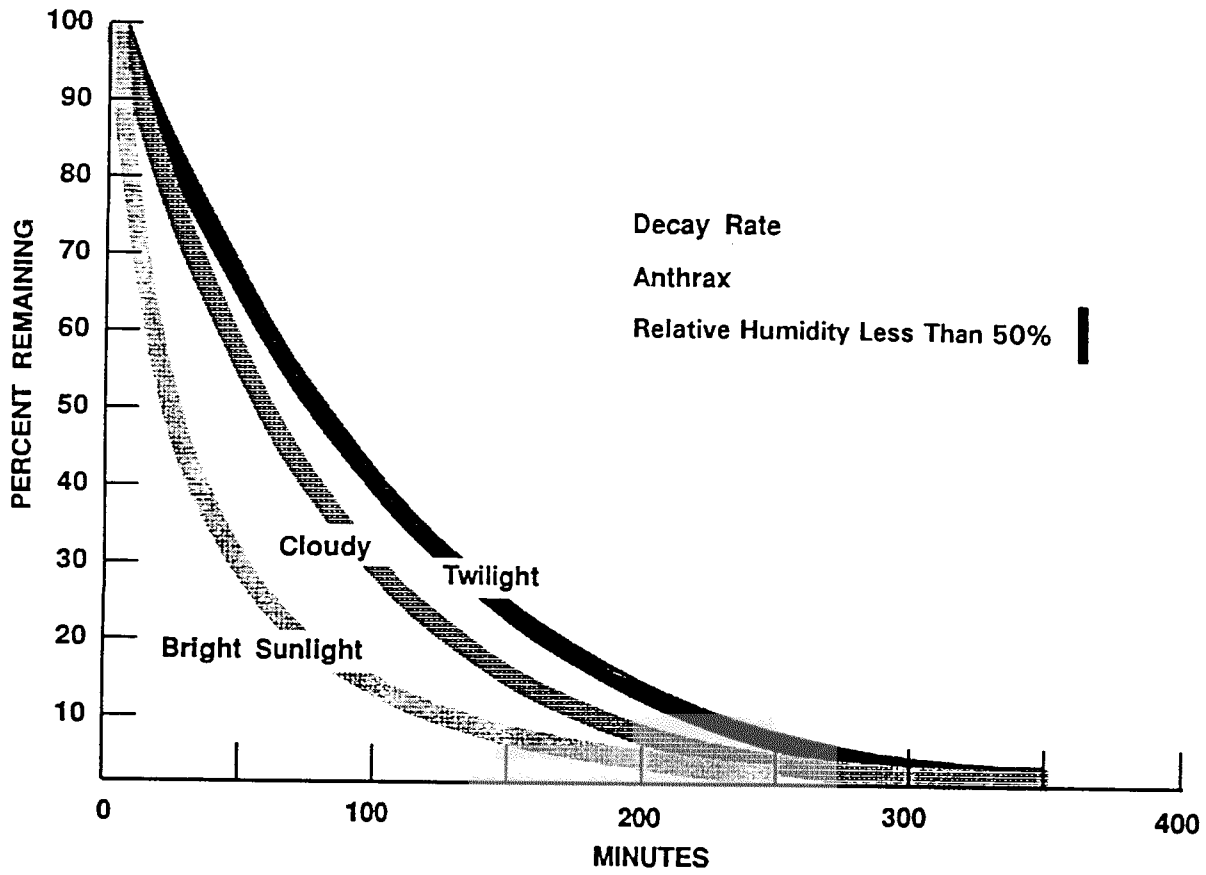


Figure B-1. Decay Rate, Anthrax, Relative Humidity < 50%.

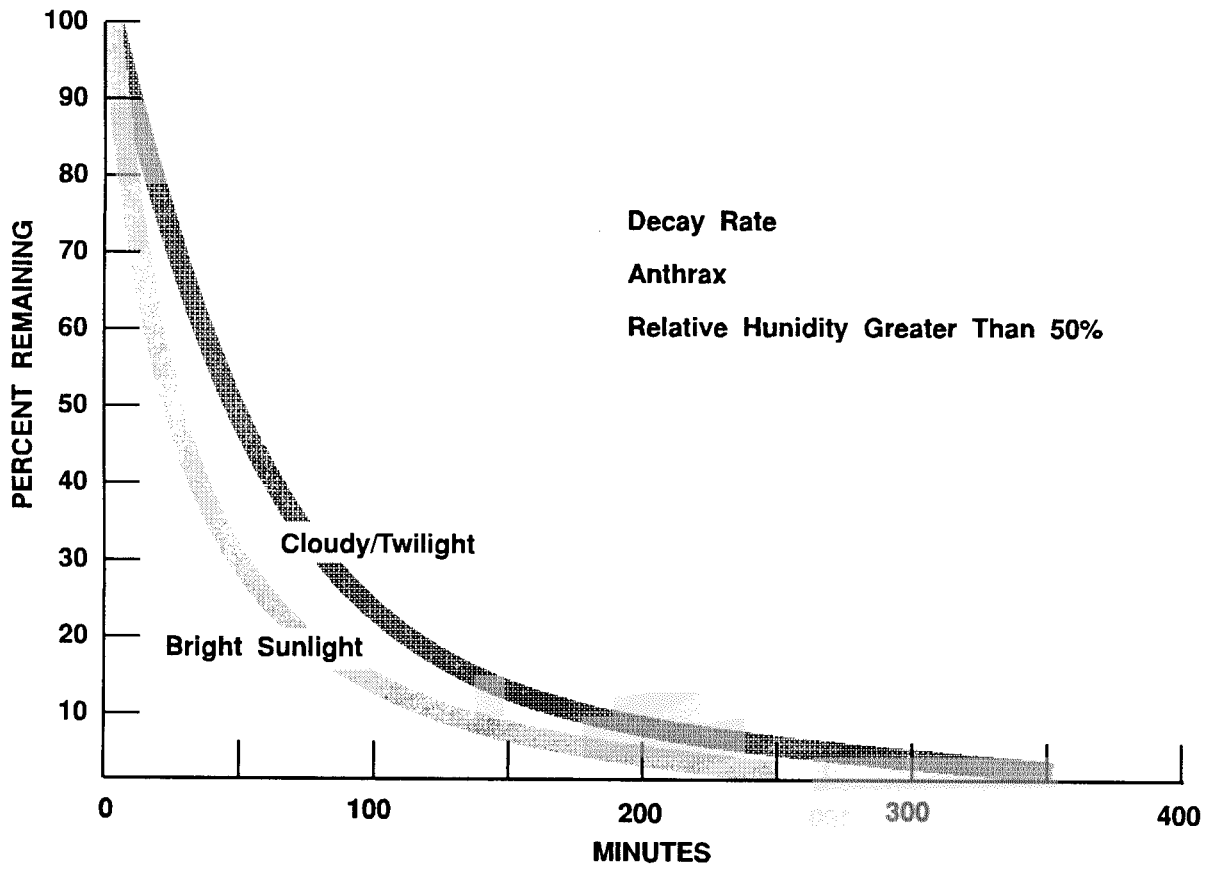


Figure B-2. Decay Rate, Anthrax, Relative Humidity >50%.

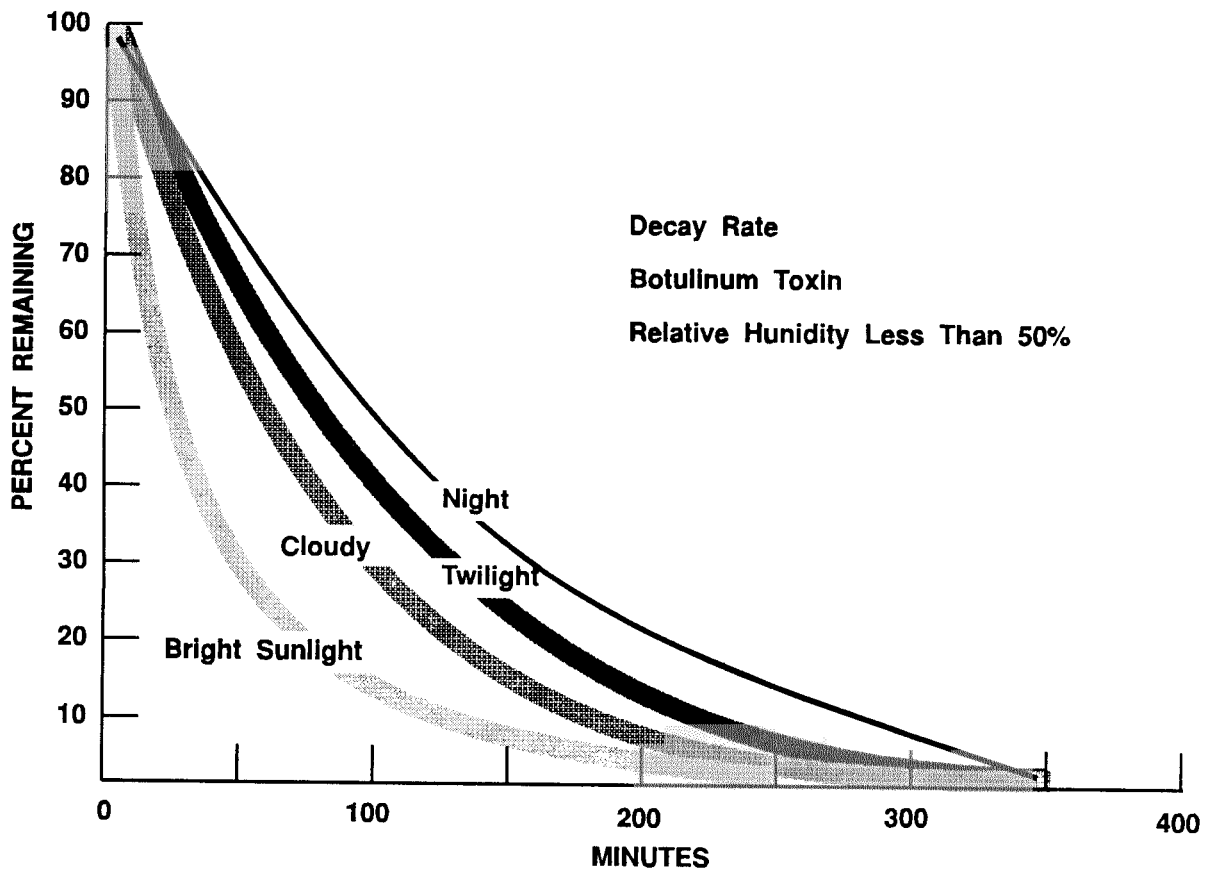


Figure B-3. Decay Rate, Botulinum Toxin, Relative Humidity < 50%.

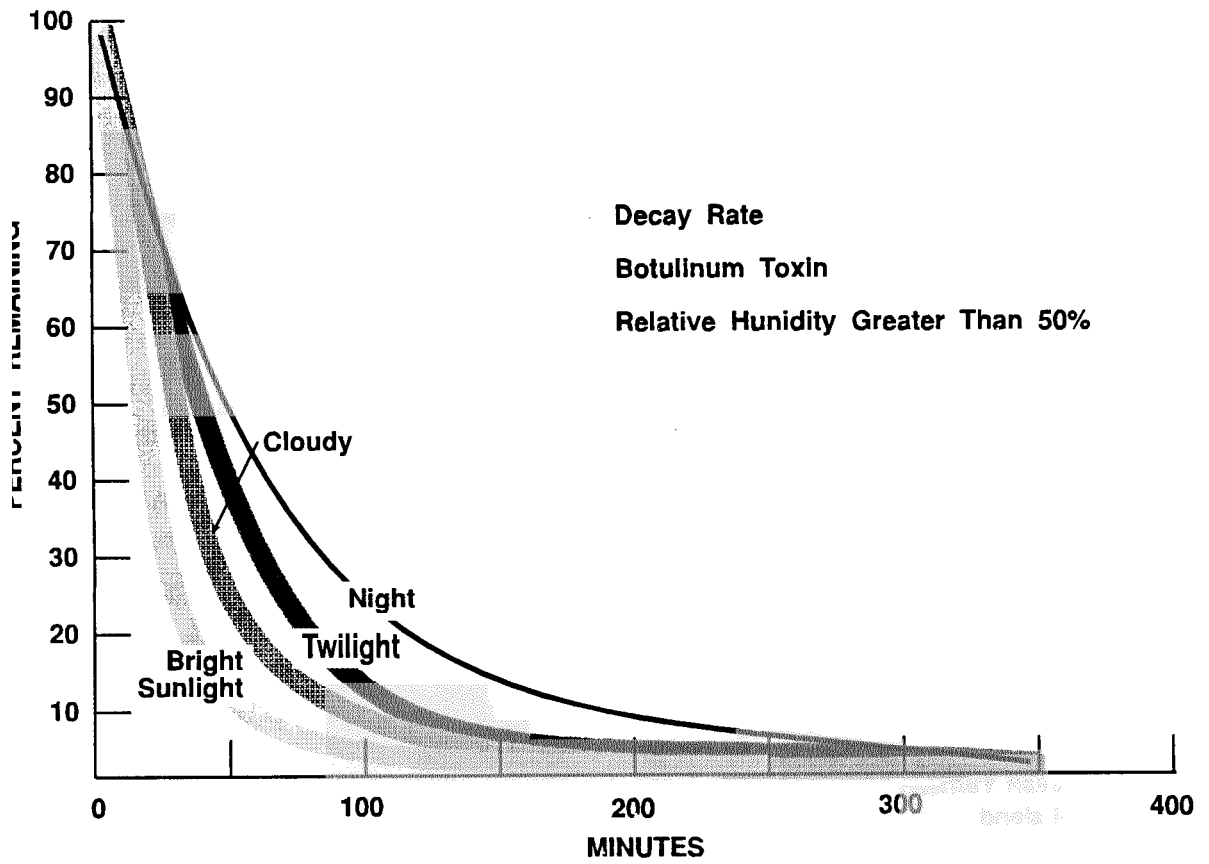


Figure B-4. Decay Rate, Botulinum Toxin, Relative Humidity > 50%.

This section defines current country codes. Geographical areas are listed in alphabetical order. These codes are used in conjunction with the biological sampling form depicted in Appendix C.

<u>COUNTRY</u>	<u>COUNTRY CODE</u>		
Afghanistan	AF	Columbia	CO
Albania	AL	Comoro Islands (Including Mayotte)	CN
Algeria	AG	Congo	CF
American Samoa	AQ	Cook Islands (Including Society Islands)	CW
Andorra	AN	Costa Rica	CS
Angola	AO	Cuba	CU
Anguilla	AV	Cyprus	CY
Antarctica	AY	Czechoslovakia	CZ
Antigua	AC	Denmark	DA
Argentina	AR	Djibouti	DJ
Australia (Including Ashmore, Cartier and Coral Sea Islands Territory)	AS	Dominica	DO
Austria	AU	Dominican Republic	DR
Bahamas, The	BF	Ecuador	EC
Bahrain	BA	Egypt	EG
Bangladesh	BG	El Salvador	ES
Barbados	BB	Equatorial Guinea	EK
Belgium	BE	Ethiopia	ET
Belize	BH	Faeroe Islands	FO
Benin (Formerly Dahomey)	DM	Falkland Islands (Islands Malvinas)	FA
Berlin	WB	Fiji	FJ
Bermuda	BD	Finland	FI
Bhutan	BT	France (Including Corsica)	FR
Bolivia	BL	French Guiana	FG
Botswana	BC	French Polynesia	FP
Bouvet Island	BV	French So. and Antarctic Islands	FS
Brazil	BR	Gabon	GB
British Indian Ocean Territory	IO	Gambia	GA
British Solomon Island	BP	Germany, Federal Republic (FRG)	GE
British Virgin Islands	VI	Ghana	GH
Brunei	BX	Gibraltar	GI
Bulgaria	BU	Gilbert and Ellis Islands (Including Phoenix, Central and Southern Line Islands)	GS
Burma	BM	Greece	GR
Burundi	BY	Greenland	GL
Cameroon	CM	Grenada	GJ
Canada	CA	Guadaloupe	GP
Cape Verde	CV	Guam	GQ
Cayman Islands	CJ	Guatemala	GT
Central African Republic	CT	Guinea	GV
Chad	CD	Guinea-Bissau	PU
Chile	cl	Guyana	GY
China	CH	Haiti	HA
Christmas Island	KT	Heard Island and McDonald Islands (Including Kerguelen, Prince Edward and Croizet Islands)	HM
Cocos (Keeling Islands)	CK	Honduras	HQ
		Hong Kong	HK
		Hungary	HU
		Iceland	IC
		India (Including Sikkim, Laccidive, Andam and Nicobar Islands)	IN
		Indonesia	ID
		Iran	IR
		Iraq	IZ

Iraq-Saudi Arabia Neutral Zone	IY	Norfolk Island	NF
Ireland	El	Norway	NO
Israel	Is	Oman (Including Kuria Mauria Island)	MU
Italy	IT	Pakistan (Including Jammu and Kashmir)	PK
Ivory Coast	Iv	Panama	PM
Jamaica (Including Morant Island and Pedro Cayo Island)	JM	Papua New Guinea	PP
Japan	JA	Paracel Islands	PF
Johnston Atoll	JQ	Paraguay	PA
Jordan	JO	Peru	PE
Kampuchea (Formerly Cambodia)	CBW	Philippines	RP
Kenya	KE	Pitcairn Islands	Pc
Korea, Democratic People's Republic	KN	Poland	PL
Korea, Republic of	KS	Portugal (Including Azores Islands and Madeira islands)	PO
Kuwait	KU	Puerto Rico	RQ
Laos	LA	Qatar	QA
Lebanon	LE	Reunion	RE
Lesotho	LT	Romania	RO
Liberia	LI	Rwanda	RW
Libya	LY	St. Christopher-Nevis	Sc
Liechtenstein	LS	St. Helena (Including Ascension and Tristan da Cunha Islands)	SH
Luxembourg	LU	St. Lucia	ST
Macao	MC	St. Pierre and Miquelon	SB
Madagascar (Malagasy Republic)	MA	St. Vincent	VC
Malawi	MI	San Marino	SM
Malaysia	MY	Sao Tome and Principe	TP
Maldive Islands	MV	Saudi Arabia	SA
Mali	ML	Senegal	SG
Malta	MT	Seychelles (Admiralty, Aldabra and Assumption)	SE
Martinique	MB	Sierra Leone	SL
Mauritania	MR	Singapore	SN
Mauritius (Including Chagos Island and Rodriguez Island)	MP	Somalia	SO
Mexico	MX	South Africa	SF
Midway Islands	MQ	Spain (Including Balearic Islands, Canary Islands, Spanish North Africa, and Ifni)	SP
Monaco	MN	Spratly Islands	PG
Mongolia	MG	Sri Lanka	CE
Montserrat	MH	Sudan	SU
Morocco	MO	Surinam	NS
Mozambique	MZ	Svalbard and Jan Mayen Islands	JS
Namibia	WA	Swaziland	WZ
Nauru	NR	Sweden	SW
Navassa Island	BQ	Switzerland	SZ
Nepal	NP	Syria	SY
Netherlands	NL	Taiwan (Including Pescadores Islands)	TW
Netherlands Antilles Islands	NA	Tanzania (Including Zanzibar and Pemba Islands)	TZ
New Caledonia	NC	Thailand	TH
New Herbrides	NH	Togo	TO
New Zealand	NZ	Tokelau Islands	TL
Nicaragua	NU	Tonga	TN
Niger	NG		
Nigeria	NI		
Niue	NE		

Trinidad and Tobago	TD	Vatican City	VT
Trust Territory of the Pacific (U.S. including Caroline Islands)	TQ	Venezuela	VE
Tunisia	TS	Vietnam	VM
Turkey	TU	Virgin Islands (U. S.)	VQ
Turks and Caicos Islands	TK	Wake Island	WQ
Tuvalu	TV	Wallisand Futuna Islands	WF
Uganda	UG	Western Sahara	WH
United Arab Emirates	TC	Western Samoa	WS
United Kingdom	UK	Yemen, North (YAR)	YE
USSR (East of 100 degrees)	UR	Yemen, South (PDRY)	YS
USSR (West of 100 degrees)	UW	Yugoslavia	YO
U.S. (Miscellaneous Pacific Islands)	IQ	Zaire	CG
Upper Volta	UV	Zambia	ZA
Uruguay	UY	Zimbabwe	ZI