NRT Quick Reference Guide:
Tick-Borne Encephalitis (TBE)

For reference, please see "Key References Cited/Used in National Response Team (NRT) Quick Reference Guides (QRGs) for Viral 2012 Revision."
QRGs are intended for Federal On-Scene Coordinators (OSCs) and Remedial Program Managers (RPMs).

<table>
<tr><td>Agent Characteristics</td><td colspan="2">Agent Classification: Biological Type: Virus Family: Flaviviridae Genus: Flavivirus
Description: Flaviviruses are small lipid-enveloped RNA viruses responsible for disease of the central nervous system. Three virus sub-types are: European or Western TBE virus; Siberian TBE virus, and Far eastern TBE virus (formerly known as Russian Spring/Summer encephalitis virus). Ticks act as both vector and reservoir, small mammals could also act as reservoir for TBE. Humans are infected with TBE through tick bites and possibly through consumption of raw milk from goats, sheep, or cows. Goats, sheep, and cows can be infected without showing signs of illness.</td></tr>
<tr><td></td><td>Bio-Safety Level: 4
CDC Category: C
USDA Select Agent: Yes
Incubation: 7-14 days
Person-to-Person Transmission: No, except from infected mother to fetus.</td><td>Treatment: Once diagnosed, treatment is supportive.
Infectivity/Lethality: Unknown/Variable (up to 40% dependent upon viral species) - if death occurs, it is usually 5 to 7 days after onset of neurologic signs.
Persistence/Stability: Persistent and stable in the tick and its offspring.</td></tr>
<tr><td>Release Scenarios</td><td colspan="2">Air/Aerosolization: No; however, aerosolization may be possible if weaponized. Laboratory-acquired infections have occurred. Known to be a laboratory aerosol hazard, when not using proper bio-safety precautions
Soil/Surfaces: Unknown.
Food: Possibly from consumption of raw milk from infected goats, sheep, or cows.
Water: Unknown
Other: Diseased ticks released into their natural environment</td></tr>
<tr><td rowspan="2">Health Effects</td><td>Onset</td><td>Symptoms may occur within 7-14 days after exposure</td></tr>
<tr><td>Signs/Symptoms per Exposure Route</td><td>General: The disease usually has two phases. In the initial phase, signs & symptoms include fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion. The second phase occurs in about 20-30% of those infected & involves the central nervous system with symptoms of meningitis (i.e., fever, headache, and a stiff neck) or encephalitis (i.e., drowsiness, confusion, sensory disturbances, and motor abnormalities such as paralysis) or meningoencephalitis. TBE disease is usually more severe in adults than in children.</td></tr>
<tr><td>Effect Levels</td><td colspan="2">Specific Effect Levels Are Unknown.
Infective Dose: Unknown
Infectivity: Unknown
Lethality: Fatality rates up to 40% have been reported for the far-eastern subtype of TBE virus.
Contact the Centers for Disease Control & Prevention (CDC) for more information: (404) 639-3311.</td></tr>
<tr><td rowspan="5">Personnel Safety</td><td>Concerns</td><td>Note: No USFDA approved vaccination is currently available in the United States.
Check with the Health & Safety Officer regarding PPE, Medical Surveillance, & Health & Safety Plan (HASP). Level of PPE may vary depending upon the incident & site-specific circumstances.</td></tr>
<tr><td>How to Properly Remove a Tick</td><td>If you find a tick attached to your skin, there's no need to panic. There are several tick removal devices on the market, but a plain set of fine-tipped tweezers will remove a tick quite effectively.
1. Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible.
2. Pull upward with steady, even pressure. Don't twist or jerk the tick; this can cause the mouth-parts to break off and remain in the skin. If this happens, remove the mouth-parts with tweezers. If you are unable to remove the mouth easily with clean tweezers, leave it alone and let the skin heal.
3. After removing the tick, thoroughly clean the bite area and your hands with rubbing alcohol, an iodine scrub, or soap and water.
Avoid folklore remedies such as "painting" the tick with nail polish or petroleum jelly, or using heat to make the tick detach from the skin. Your goal is to remove the tick as quickly as possible--not waiting for it to detach.
If you develop a rash or fever within several weeks of removing a tick, see your doctor. Be sure to tell the doctor about your recent tick bite, when the bite occurred, and where you most likely acquired the tick.</td></tr>
<tr><td>Medical</td><td>Baseline: Annual physical & respiratory function exams.
Treatments Available: If exposed, seek medical attention. Treatment is supportive.</td></tr>
<tr><td>First Aid</td><td>During Incident: Conduct medical monitoring; use PPE as designated by the HASP; record the PPE levels used; monitor for fever & other signs/symptoms as listed under Health Effects, &, if necessary, ensure medical attention is provided as soon as possible. Thoroughly examine body for ticks; if found remove as cited above.
Post Incident: Monitor for signs/symptoms &, if necessary, ensure medical attention is provided as soon as possible.</td></tr>
<tr><td>PPE (aerosolized release)</td><td>Emergency Response to a Suspected Biological Incident: Possible PPE Levels for emergency responders is based on scenario risks from highest level of protection to least: 1) Pressure-demand Self Contained Breathing Apparatus (SCBA) with Level A protective suit, when: a) Event is uncontrolled, b) The type(s) of airborne agent(s) is unknown, c) The dissemination method is unknown, d) Dissemination via an aerosol-generating device is still occurring, e) Dissemination via an aerosol-generating device has stopped, but there is no information on the duration of dissemination, or what the exposure concentration may be. 2) Pressure-demand SCBA with Level B protective suit, when: a) The suspected biological aerosol is no longer being released, b) Other conditions may present a splash hazard. 3) Full-facepiece respirator with P100 filter or PAPR with HEPA filters, when: An aerosol-generating device was not used to create high airborne concentration. 4) Disposable hooded coveralls, gloves, & foot coverings, when: Dissemination was by a letter, package, or other material that can be bagged, contained, etc.
Other Workers: PPE recommendations for workers other than emergency responders must be developed in the HASP for the specific scenario. PPE recommendations will vary by job type (e.g., cleanup, decon, etc.), type of exposure (e.g., airborne or surface/liquid/soil hazard), & any other site hazards (e.g., chemical, physical, etc.)</td></tr>
<tr><td>PPE (tick release)</td><td>Emergency Response to a Suspected Biological Incident: Apply an insect repellent containing DEET according to the manufacturer's directions is recommended. Besides wearing long sleeves and slacks, DEET insect repellent should be applied to your hands, arms, and legs even if they are fully covered with clothing. Spray a little on your hair. Be very particular about protecting the back of your neck with such tick repellent, as ticks normally lodge more at such places. Do not apply over cuts, wounds, or irritated skin.</td></tr>
<tr><td rowspan="2">Sampling</td><td colspan="2">Portable and Fixed Aerosol Monitoring: No field detection methods are currently employed.</td></tr>
<tr><td colspan="2">CONCERNS: BEFORE OBTAINING SAMPLES: Identify sample transportation requirements; Contact EPA/HQ-EOC (202-564-3850) for ERLN contract laboratories able to analyze these types of samples; Clearly identify & coordinate with the laboratory to be used since most labs cannot analyze all types of media (e.g., wipes, swabs, filters, etc.); Coordinate with the sample disposal facility for acceptance criteria (i.e., sample decon requirements); Coordinate with investigative units (EPA-CID & FBI) to ensure sample chain-of-custody is maintained between the groups. Note: Sampling techniques, analytical equipment and detection levels will be site-specific & depend on: 1) characteristics of the agent; 2) type of contaminated surfaces (e.g., porous v. nonporous); 3) response phase & purpose of sampling; 4) collection and storage methods applied; 5) transportation regulations; 6) laboratory sample acceptance criteria and; 7) decon requirements of sample waste disposal facility.</td></tr>
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	CAUTION: VERIFICATION OF ALL HEPA EQUIPMENT EFFICIENCY IS REQUIRED **Aerosolized Sampling Location Plans:** If the initial point of the aerosolized release is known, start with an area thought to be free of contamination & work in concentric circles towards the initial point of contamination. Be concerned about likely contaminated areas (e.g., elevator buttons, mail, corners of hallways, baseboards, light switches, door knobs) due to foot traffic or ventilation systems. This virus can infect humans & animals (i.e., goats, sheep, cows). Based on site characteristics & laboratory capacity, a sampling plan may be judgmental, probabilistic, or a combination thereof.
	AEROSOLIZED RELEASE **A site-specific sampling plan should be reviewed & approved by appropriate Subject Matter Experts &/or through ICS channels.** **Consult EPA/HQ-EOC at 202-564-3850 for Environmental Response Laboratory Network (a.k.a. ERLN laboratory) personnel who can explain sampling procedure that is compatible with current analytical procedure.** **Types of Samples:** Air, water, soils, surfaces, & environmental. **Air:** Collect air samples with gel filter or impinger. Refer to the manufacturer's aseptic sampling methods, flow rates, & sampling times. Ensure that the appropriate pump is used for the selected sampling method. **Water**: While TBE viral persistence in water is unknown, it might as it persists in dairy products. Therefore, any consumable liquid should be sampled. If the consumable liquid is chlorinated, the chlorine needs to be neutralized immediately with a sodium thiosulfate or other neutralizer at the concentration specified by the analytical laboratory prior to shipment. As chlorine levels can vary substantially throughout a drinking water system, it is not always appropriate to assume that a sample is chlorinated based solely on a description of the water treatment processes in use. **Soil:** For the localized areas where soil deposition of the agent is suspected to have occurred (i.e., aerosol release), a surface soil sample from a depth of less than 1 inch (2.54 cm) should be obtained from non-vegetated area. **Surfaces: 1)** Wipe & Swab Sampling (for non-porous surfaces): Sterile macrofoam swabs moistened with 1X phosphate-buffered saline supplemented with 0.01% Tween-20 (PBST). If this solution is not available, use sterile de-ionized water (DI). Do NOT use dry wipes or swabs. **2)** HEPA Vacuum Sampling (for both porous & non-porous surfaces): collect samples in a HEPA sock designed to fit into an inlet nozzle of a HEPA vacuum cleaner. Good for screening & determining the extent & location of contamination in large areas.
	TICK RELEASE **A site-specific sampling plan should be reviewed & approved by appropriate Subject Matter Experts &/or through ICS channels.** **Vector/Reservoir:** Use cloth dragging methods or CO_2 lures to capture ticks. Contact APHIS Wildlife Services for additional information: 877-303-6363.
	Sample Packaging & Shipping: The packaging & shipping of samples are subject to strict regulations established by DOT, CDC, USPS, OSHA, & IATA. Contact the sample-receiving laboratory to determine if they have additional packaging, shipping or labeling requirements. Aerosolized TBE virus samples or tick species should be packaged in an air-tight container & kept at temperatures of 40-50°F (4-10°C). Ensure samples are not placed directly on the chemical ice used for cooling the shipping container.
	CAUTION: Many labs may not be able to perform analysis on all matrices (e.g., aerosolized or tick release). The goal of laboratory analysis for environmental sampling purposes is to determine if viable TBE virus is present in the sample. NOTE: The selected laboratory may use a tiered approach. If a tiered approach is used, the initial analysis may only determine if select/particular components of the virus are present in the sample (e.g., presence or absence). It may take additional time (up to weeks depending on the laboratory) to determine if the virus is viable & still able to cause adverse effects. **Laboratory Information:** Contact EPA/HQ-EOC at 202-564-3850 for contact information for ERLN laboratory personnel who specialize in biological sample analysis.
Decontamination/Cleanup	**AEROSOLIZED RELEASE** **Decon/Cleanup Planning:** Site-specific decon/cleanup plan should be developed & approved by all necessary organizations/SMEs via ICS channels. Responders should develop a plan that takes into account: **1)** Nature of contamination including physical properties, how it entered the facility, etc.; **2)** Extent of contamination, including the amount & possible pathways that have or could have spread the virus. It is advisable to isolate the contaminated area; & **3)** Objectives of decon, including decon of critical items for re-use & the treatment, removal, or packaging of other items for disposal. **Note:** Crisis exemptions from EPA's Office of Pesticide Programs might be necessary depending on decontaminating agents used. **WARNING: DECON SOLUTIONS SHOULD NOT BE DEPLOYED AS A SPRAY.** **Decon Methods:** Decon decisions will be site & situation specific but due to re-aerosolization concerns, ***under NO circumstances should a non-HEPA vacuum cleaner or a broom be used.*** EPA's National Decon Team, call the NRT pager at 800-329-1841 can provide specific decontamination parameters & the requirements for using readily available commercial items such as household bleach. For large areas, low-tech cleanup methods most likely won't be used – rather, widespread fumigation would be the most expedient & cost effective method selected. For small areas of contamination, discreet area decon methods would typically proceed as follows: allow aerosols to settle & wear protective clothing; gently cover any contaminated areas with paper towel(s) (overlapping each other if necessary) & apply decon solutions. This virus can be inactivated by the following decon solutions: **1)** pH-amended bleach solution (i.e., 1 part household bleach, 1 part vinegar & 8 parts water); **2)** a 70% aqueous solution of ethanol, 3) a 5% aqueous solution of a phenolic germicidal detergent (e.g., industrial strength Lysol®), 1% sodium hydroxide, & 2% glutaraldehyde. Apply the decon solution by starting at the perimeter & wet towards the center of the contaminated area. Ensure sufficient contact time (i.e., 60 minutes) is provided & ensure the paper towel is kept "sopping" wet during this time. Remove the paper towel(s) then wipe up the residual dampness/drops of disinfectant until surface is dry. Reapply disinfectant to the bare surface & wipe up again with more paper towel(s) then let surface air-dry. All contaminated decon materials (e.g., paper towels, etc.) should be appropriately treated & discarded as bio-hazardous waste. **Verification of Decon:** Site and situation specific. Please contact ERT (732-321-6660) and/or NDT (800-329-1841) for further assistance.
	TICK RELEASE Contact USDA APHIS 877-303-6363 or USDA Operations Center 877-677-2369. Both numbers are in operation 24 hours per day.
Waste Disposal	**CAUTION:** Regardless of aerosolized or tick release, hazardous waste transportation & disposal are regulated federally; however, more stringent regulations may exist under state authority. These regulations differ from state-to-state. Detailed state regulations can be found at www.envcap.org.
	Waste Disposal Planning: Regardless of aerosolized or tick release, waste generated from assessment & cleanup activities should be incinerated, autoclaved, chemically disinfected, or fumigated & then tested to be sure the agent(s) were inactivated. Waste disposal for agent-contaminated wastes generated from the decontamination & disposal activities will be problematic. Landfills willing to take these wastes may be limited & incineration may be prohibitively expensive or impractical. All waste disposal options should be investigated as early into the response process as possible. Transportation of the agent contaminated wastes from the site to the landfill or incinerator may be problematic as well. First, agreements must be reached between the waste sender & acceptor BEFORE transport, followed by timely public notification of the transport & disposal phases. Transportation of hazardous waste may cross several states and localities, which may exceed federal regulations. Requirements for transporting hazardous materials, & procedure for exemption, are specified in http://www.fmcsa.dot.gov/safety-security/hazmat/complyhmregs.htm#hmp. The U.S. EPA has developed a web-based Incident Waste Management Planning & Response Tool which contains guidance related to waste transportation, contact information for potential treatment, disposal facilities, & state regulatory offices, packaging guidance to minimize risk to workers, & guidance to minimize the potential for contaminating the treatment or disposal facility. Access to the EPA's web based disposal tool requires pre-registration (http://www2.ergweb.com/bdrtool/login.asp).