

**West Nile Virus in California:
Guidelines for Human Testing and Surveillance
Within the Regional Public Health Laboratory Network**

California Department of Public Health
Viral and Rickettsial Disease Laboratory
Richmond, California

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West Nile Virus in California: Guidelines for Human Testing and Surveillance Within the Regional Public Health Laboratory Network

Diagnostic Testing Guidelines

West Nile virus (WNV) testing within the regional public health laboratory network (i.e., the California Department of Public Health Viral and Rickettsial Disease Laboratory and participating local public health laboratories) is recommended for individuals with the following:

- A. Encephalitis
- B. Aseptic meningitis (Note: Consider enterovirus for individuals ≤ 18 years of age)
- C. Acute flaccid paralysis; atypical Guillain-Barré Syndrome; transverse myelitis; or
- D. Febrile illness*
 - a. Illness compatible with West Nile fever and lasting ≥ 7 days
 - b. Must be seen by a health care provider

* The West Nile fever syndrome can be variable and often includes headache and fever ($T \geq 38^{\circ}\text{C}$). Other symptoms include rash, swollen lymph nodes, eye pain, nausea or vomiting. After initial symptoms, the patient may experience several days of fatigue and lethargy.

Identification of human cases is important early in the West Nile virus season to assess the burden of human illness and target mosquito control and public education activities to reduce exposure risk. However, depending on the volume of tests requested and laboratory capacity, local public health laboratories may need to consider limiting testing to individuals in categories A – C (encephalitis, meningitis, acute flaccid paralysis) once West Nile virus is established in a given area.

Submitting Specimens to Regional Public Health Laboratory Network for Testing

Required specimens:

- Acute serum: $\geq 2\text{cc}$ serum
- Cerebrospinal fluid (CSF): 1-2cc CSF if lumbar puncture is performed

If West Nile virus is highly suspected and acute serum is negative or inconclusive, request:

- 2nd serum: $\geq 2\text{cc}$ serum collected 3-5 days after acute serum

Paired acute and convalescent serum specimens are useful for demonstration of sero-conversion to WNV. Paired samples should be collected whenever WNV is suspected. Although a single acute serum may provide evidence of recent WNV infection, a negative acute serum does not necessarily rule out infection. Occasionally, a specimen may be collected too soon to show antibody related to a current illness (e.g. with immunocompromised individuals).

Specimens must be submitted with a completed specimen submittal form (See **Appendix A: Instructions for Submitting Specimens**; and **Appendix B: West Nile Virus Specimen Submittal Form**).

Viral and Rickettsial Disease Laboratory Testing Algorithm

- When both serum and CSF are received, enzyme immunoassay (EIA) is done on serum (CSF is stored in case additional confirmatory testing is needed)
- If only CSF is received, EIA is done on CSF (*Note: Focus EIA IgM is not currently FDA-approved for use on CSF; if CSF is positive, a confirmatory serum sample will be requested*)
- Immunofluorescence assay (IFA) may be done as an adjunct test on serum (IFA is not done on CSF)
- Neutralization testing is done to resolve indeterminate results, or by request
- Enterovirus PCR may also be done on CSF specimens on a seasonal basis, depending on the availability of resources at VRDL
 - Call 510-307-8606 to find out whether the most current algorithm includes enterovirus PCR
- See **Appendix C: VRDL WNV Testing Algorithm – Serum**; **Appendix D: VRDL WNV Testing Algorithm – CSF**; and **Appendix E: WNV Laboratory Testing at VRDL**

Laboratory Diagnosis and Test Interpretation

- Local public health laboratories are encouraged to perform at least two different assays on each suspect case, e.g. IgM by EIA and IgM by IFA, or IgM and IgG by IFA
- For the first suspect cases of each WNV season, VRDL recommends that local public health labs obtain repeat/confirmatory test results from VRDL
- IFA is a more subjective assay than EIA and should be interpreted with caution
- IgG(+) result only (i.e., negative for IgM) typically indicates previous infection of a flavivirus
 - Check case history for travel to flavivirus-endemic areas, length of time between onset of symptoms and collection of specimen, vaccination history, etc.
 - If current infection is still suspected, obtain convalescent serum to test for seroconversion
- VRDL is always available for consultation on test results with local public health laboratories

Interpretation of West Nile virus antibody test results*

Tests	Results	Interpretation
IgM IgG	negative negative	Antibody not detected
IgM IgG	negative positive	Infection at undetermined time
IgM IgG	positive negative	Possible evidence of recent or current infection; further testing necessary**
IgM IgG	positive positive	Evidence of recent or current infection***
IgM IgG	indeterminate negative	Inconclusive ‡request convalescent serum

* Due to heterotypic antibody responses and/or cross-reactions, serologic results should be interpreted on the basis of clinical and epidemiological information

** Note the possibility of a false positive IgM result (EIA)

*** Note that some individuals may have persisting antibodies from the previous WNV season

‡ Paired acute and convalescent serum samples may be useful for demonstration of seroconversion

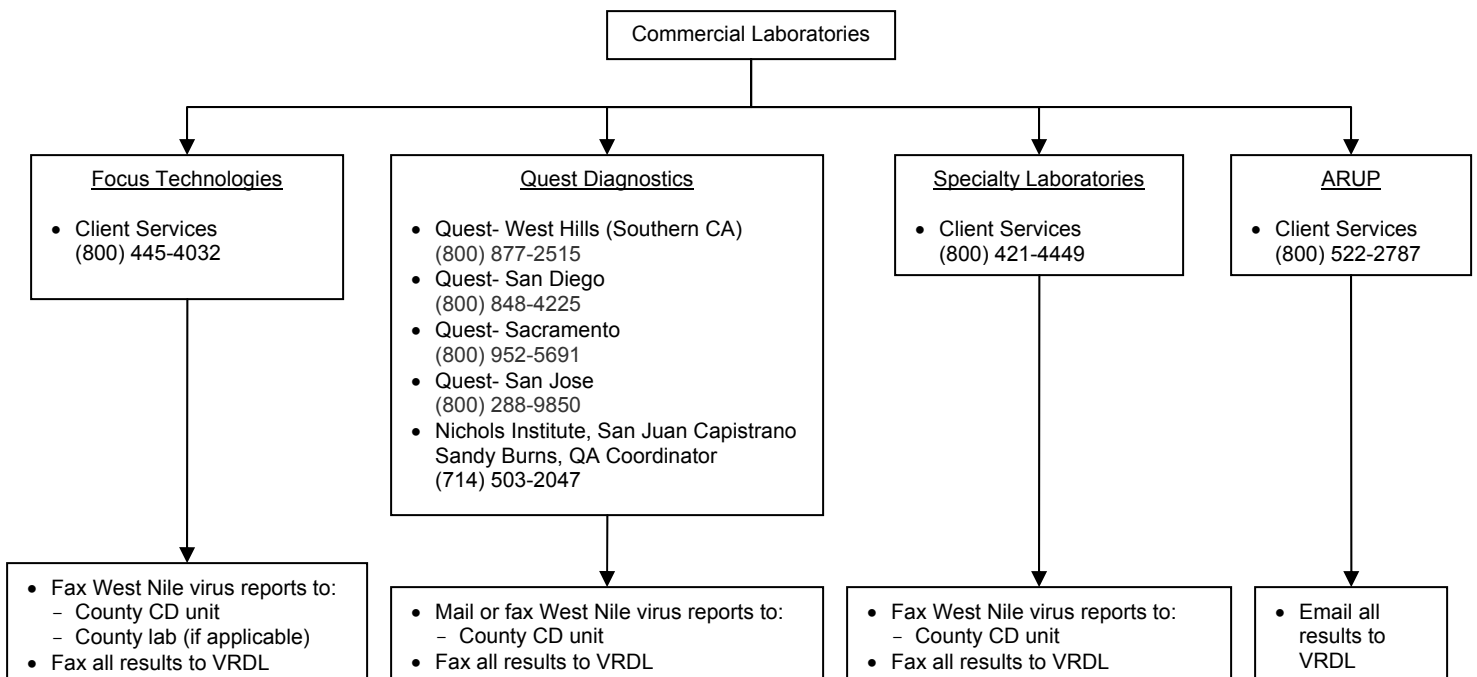
Case Classification: Regional Public Health Laboratory Network

A case is considered to be WNV positive if the patient has a clinically compatible illness (See **Appendix F** for case definition) and has the following laboratory results:

- IgM(+) by two different assays (e.g. EIA and IFA); or
- IgM(+) and IgG(+) by EIA; or
- IgM(+) and IgG(+) by IFA; or
- Rising IgG antibodies

Results from Commercial or Reference Laboratories

- California Code of Regulations, Title 17, Section 2505 requires laboratories to report positive West Nile virus test results to the local health department
- Local health departments should follow up on IgM(+) results from commercial labs
 - If a patient has clinically compatible illness and is IgM-positive *and* IgG-positive, the commercial lab results are sufficient to conclude that patient is infected with WNV – however, for the first few cases of the WNV season, it is recommended that positive results from commercial labs be verified by repeat/confirmatory testing at the local public health lab and/or VRDL
 - If patient is IgM-positive and IgG-negative, be aware that IgM can be falsely positive; follow-up testing is suggested
- IgG-positive result only (i.e., IgM-negative) typically indicates previous infection
- When in doubt, try to obtain either the original specimen or a convalescent sample to forward to the local public health lab or to VRDL for repeat/confirmatory testing
- Public health reporting by commercial laboratories is being facilitated by VRDL (see below)

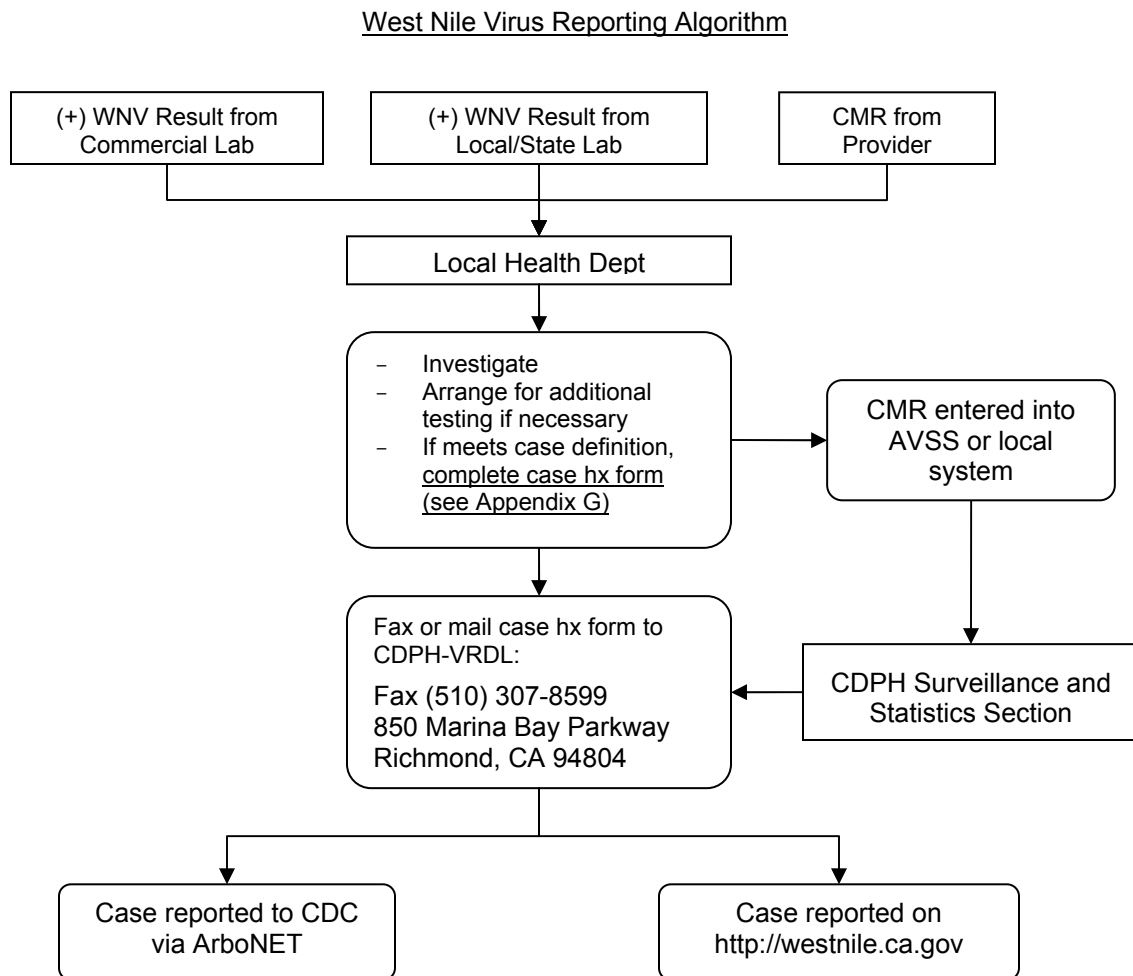


West Nile Virus-Associated Fatalities

Determining whether or not West Nile virus infection has played a causal role in a fatality can be difficult. West Nile virus may not always be listed as a contributory or underlying cause of death on death certificates. Patients often have many underlying conditions and preexisting medical problems that also may be related to the immediate causes of death. In general, if a patient was diagnosed with West Nile virus and never recovered from the sequelae (e.g. was discharged to convalescent hospital until date of death), a health department may consider designating the patient as a WNV-associated fatality.

Reporting

Since West Nile virus infection is a laboratory diagnosis, and since West Nile surveillance is a multi-component system maintained nationwide through ArboNet (CDC's source for WNV data), reporting human cases of West Nile virus to the California Department of Public Health is done through slightly different routes than regular disease reporting. The algorithm below outlines the various paths through which West Nile virus infections may be reported.



Important Issues about Reporting

- West Nile virus infection is reportable by both laboratories and providers
- Fax or mail case report forms (See **Appendix G: West Nile Virus (WNV) Infection Case Report**; and **Appendix H: Report of West Nile Virus-Positive Blood Donor to the California Department of Public Health**) to the Viral and Rickettsial Disease Laboratory (VRDL) – please indicate, either on form or by phone/email, that individual has tested positive for WNV:
Fax (510) 307-8599; VRDL-West Nile, 850 Marina Bay Parkway, Richmond, CA 94804
- **Only cases reported to CDPH-VRDL are entered into ArboNET and posted on the California WNV website** – If a local agency uses AVSS or another local system for their disease surveillance, they will enter West Nile infections separately into those systems, as well as send a case history form to CDPH-VRDL
 - The following AVSS classifications can be used to enter cases:
 - ENCP-WNV: For West Nile encephalitis cases
 - MENG-WNV: For West Nile meningitis cases
 - WNV-FVR: For West Nile fever cases
 - WNV-AFP: For West Nile acute flaccid paralysis cases
 - WNV-ASYM: For WNV infections detected via blood bank with no accompanying illness
 - WNV-UNK: For cases with unknown or undeterminable clinical status
 - CDPH-VRDL will check AVSS for reported WNV infections that may not have been previously reported
- Health departments should notify their local vector control agency of any confirmed human West Nile virus activity as soon as possible, so that enhanced mosquito surveillance and control measures can be implemented
- A line list of locally acquired WNV cases will be maintained and updated biweekly on the California WNV website (<http://westnile.ca.gov>)
- Report clinical syndrome as West Nile fever, neuroinvasive disease (specify encephalitis, meningitis, acute flaccid paralysis, or other), unknown, or asymptomatic (not a case)
- Contact VRDL if local lab or health department knows of a case that is not on website or ArboNET

Important Issues about VRDL Results

- All VRDL results are faxed and mailed to submitting local public health lab, and faxed to local health department of patient's residence
- Local health departments need to report West Nile virus results to providers
- VRDL results are routinely reported to local health departments/labs
 - Positive results relayed immediately by phone or email, then followed up with fax/mail
 - Negative results faxed/mailed to labs 1-2 times/week
- Fax requests for results (include patient name and identifier e.g. date of birth) to:
(510) 307-8599, Attn: West Nile Virus Project

Contacts

Viral and Rickettsial Disease Laboratory

West Nile Virus Surveillance Project:

Cynthia Jean, MPH	(510) 307-8606
	Pager (510) 639-8667
Shilpa Gavali Jani, MPH.....	(510) 307-8608
	Pager (510) 641-5286
Carol Glaser, DVM, MD (for clinical consultation).....	(510) 307-8613
	Pager (510) 720-0078
West Nile Virus Surveillance Project Fax	(510) 307-8599

Vector Borne Disease Section

West Nile Virus Hotline (877) 968-2473

Links

California West Nile Virus Website <http://westnile.ca.gov>
CDC West Nile Virus Website <http://www.cdc.gov/ncidod/dvbid/westnile/>

Appendices

- A. Instructions for Submitting Specimens
- B. West Nile Virus Specimen Submittal Form
- C. Viral and Rickettsial Disease Laboratory West Nile Virus Testing Algorithm – Serum
- D. Viral and Rickettsial Disease Laboratory West Nile Virus Testing Algorithm – CSF
- E. West Nile Virus Laboratory Testing – Viral and Rickettsial Disease Laboratory
- F. Revised (2004) National Surveillance Case Definition of Domestic Arboviral Disease
- G. West Nile Virus Infection Case Report
- H. West Nile Virus-Positive Blood Donor Report Form

Appendix A

Instructions for Submitting Specimens

- Refrigerated specimens should be sent on **cold pack** using an overnight courier
 - If CSF needs to be stored ≥ 48 hours before submittal, freeze at -20°C
 - Ship frozen specimens on dry ice
- Each specimen should be clearly labeled with **patient name**, **specimen type**, and **date of specimen collection**
- **Specimens must be submitted with a specimen submittal form.** The following information is asked for on the specimen submittal form because it is important for accurate interpretation of results:
 - Onset date
 - Unusual immunological status of patient, if any
 - County of residence
 - History of travel to flavivirus-endemic areas
 - History of prior vaccination against flavivirus disease
 - Brief clinical summary including clinical diagnosis
- **Please include any West Nile virus test results obtained by the local public health laboratory or a commercial reference laboratory**
 - Other laboratory results affect the VRDL testing algorithm; Specimens that have screened positive or indeterminate for WNV IgM antibodies at another laboratory will be immediately tested with the heterophile subtract procedure
- **Do not send specimens on Fridays for weekend delivery** (VRDL Specimen Receiving Hours M-F 8-5)
- Address specimens for VRDL to:
Specimen Receiving/ West Nile
850 Marina Bay Parkway
Richmond, CA 94804

Appendix B: Specimen Submittal Form (version for use by local public health labs)

West Nile virus testing is recommended on individuals with the following:

- A. Encephalitis
- B. Aseptic meningitis (Note: Consider enterovirus for individuals ≤ 18 years of age)
- C. Acute flaccid paralysis; atypical Guillain-Barré Syndrome; transverse myelitis; or
- D. Febrile illness compatible with West Nile fever* and lasting ≥ 7 days (must be seen by health care provider):

* The West Nile fever syndrome can be variable and often includes headache and fever ($T \geq 38^\circ\text{C}$). Other symptoms include rash, swollen lymph nodes, eye pain, nausea or vomiting. After initial symptoms, the patient may experience several days of fatigue and lethargy.

1. **Required specimens:**

- Acute Serum:** ≥ 2 cc serum
- Cerebrospinal Fluid (CSF):** 1-2cc CSF if lumbar puncture is performed

2. If West Nile virus is highly suspected and acute serum is negative or inconclusive:

- 2nd Serum:** ≥ 2 cc serum collected 3-5 days after acute serum

- Refrigerated specimens should be sent on **cold pack** using an overnight courier
- If CSF is frozen, send on dry ice (all specimens may be sent on dry ice)
- Each specimen should be labeled with **date of collection**, **specimen type**, and **patient name**
- Please do not send specimens on Fridays (Specimen Receiving Hours: M-F 8-5)
- Send specimens to CDPH VRDL: **Specimen Receiving – West Nile**
850 Marina Bay Parkway
Richmond, CA 94804
- Local Public Health Laboratory West Nile **IFA/EIA IgM results** (or attach copy of results):

Specimen	Date Collected	IgM Assay Method	Results			
			Negative	Reactive	Indeterminate	Not Tested
		<input type="radio"/> IFA <input type="radio"/> EIA				
		<input type="radio"/> IFA <input type="radio"/> EIA				

**** IMPORTANT: THE INFORMATION BELOW MUST BE COMPLETED AND SUBMITTED WITH SPECIMENS ****

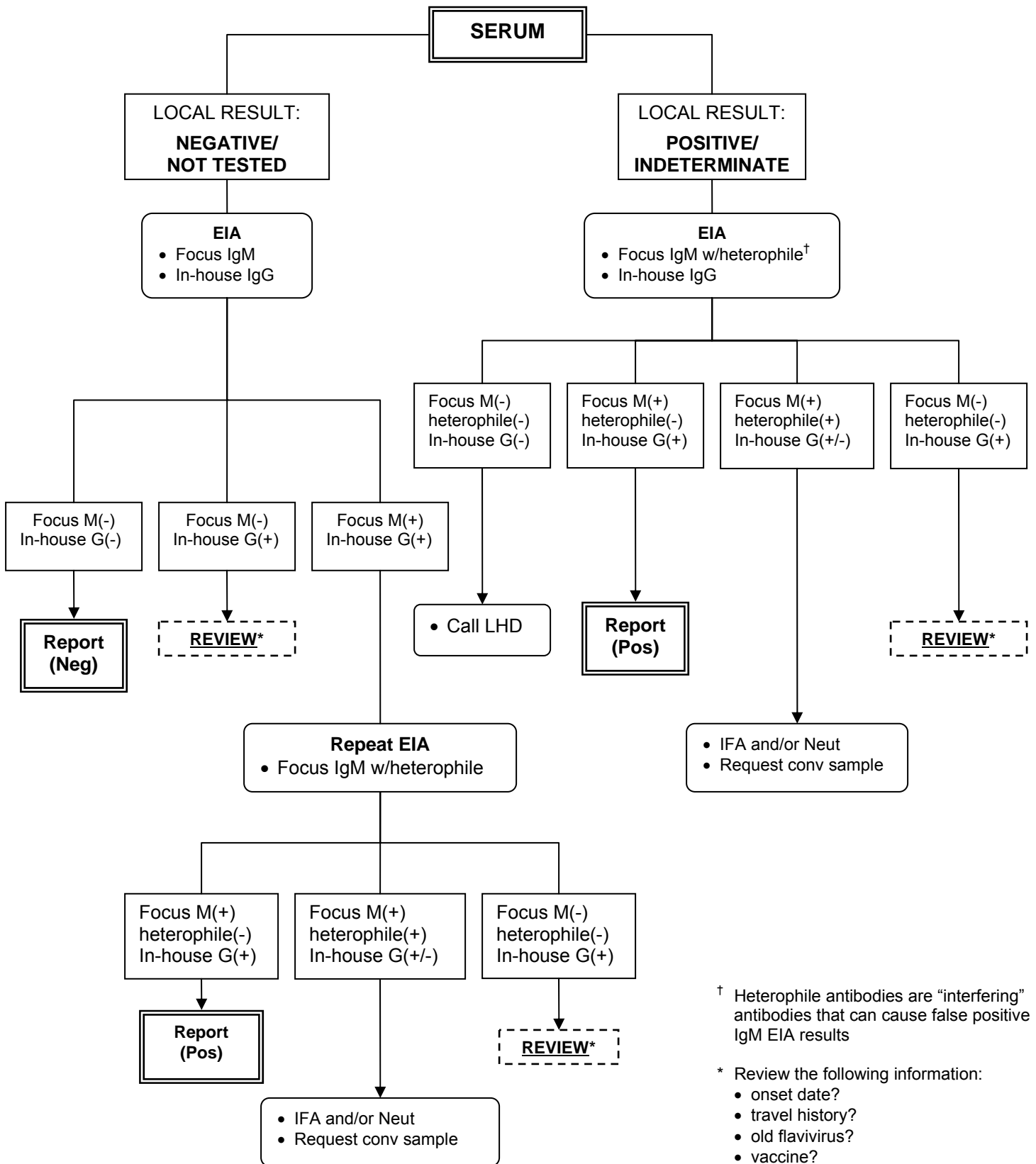
Patient's last name, first name:			Patient Information			
			Address _____			
Age or DOB:		Sex (circle): M F	Onset Date:	City _____ Zip _____ County _____		Phone Number (_____) _____
Clinical findings: <input type="radio"/> Encephalitis <input type="radio"/> Meningitis <input type="radio"/> Acute flaccid paralysis <input type="radio"/> Febrile illness <input type="radio"/> Other: _____			Other information (immunocompromised, travel hx, hx of flavivirus infection, etc.):			
Other tests requested:			This section for Laboratory use only. Date received by VRDL and State Accession Number			
1 st	Specimen type and/or specimen source	Date Collected	1 st			
2 nd	Specimen type and/or specimen source	Date Collected	2 nd			
3 rd	Specimen type and/or specimen source	Date Collected	3 rd			

Questions? Call Cynthia Jean at (510) 307-8606

California Department of Public Health Viral and Rickettsial Disease Laboratory

Submitting Facility _____ Phone Number (_____) _____

Appendix C: Viral and Rickettsial Disease Lab West Nile Virus Testing Algorithm - Serum

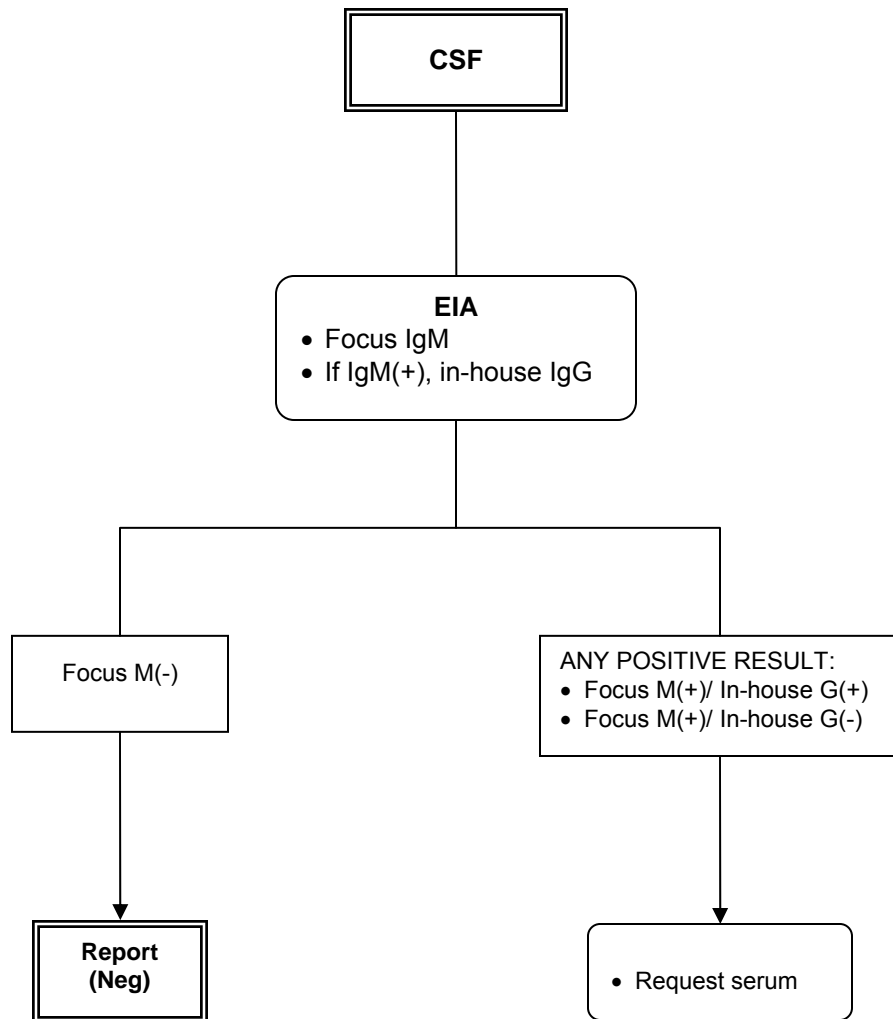


† Heterophile antibodies are “interfering” antibodies that can cause false positive IgM EIA results

* Review the following information:

- onset date?
- travel history?
- old flavivirus?
- vaccine?

Appendix D: Viral and Rickettsial Disease Lab West Nile Virus Testing Algorithm - CSF



Appendix E: West Nile Virus Laboratory Testing at California Department of Public Health, Viral and Rickettsial Disease Laboratory

Laboratory diagnosis of human West Nile virus (WNV) infection is a multi-step process. In some cases, physicians send specimens to private commercial laboratories for WNV diagnostic testing. More commonly, specimens are sent to the local or state health department for diagnostic laboratory testing.

Testing available at the California Department of Public Health Viral and Rickettsial Disease Laboratory includes:

Serologic tests

Enzyme Immunoassay (EIA) testing: The immunoglobulin M (IgM) EIA is the frontline test for WNV diagnosis. The EIA is the ideal test because it is both simple and sensitive (i.e., highly likely to find true positives) and it can be used with both serum and cerebrospinal fluid (CSF) specimens. EIA testing can be completed in 1 to 2 days from the time samples arrive at the laboratory. Generally several specimens are done on each EIA run.

The immunoglobulin G (IgG) EIA test is used as an adjunct test—a single IgG result cannot differentiate between old and new infection; however, paired sera showing significant change in IgG antibody levels can be helpful.

Immunofluorescence Assay (IFA) testing: IFA tests for WNV can also test for IgM and IgG antibodies. The advantages of these tests are that they are rapid and amenable to just a few samples. However, the IFA is a more subjective assay than the EIA.

Molecular tests

Molecular methods for WNV testing can be used as an adjunct to the serologic tests. For diagnosis of clinical disease, serological tests are more accurate than molecular tests. Reverse Transcriptase - Polymerase Chain Reaction (RT-PCR) is a process that uses nucleic acid amplification techniques. While these tests can be useful in diagnosis, they have low sensitivity for a variety of reasons for WNV, making them inappropriate as the sole test for laboratory diagnostic testing of possible human WNV infections. An advantage of this method is the relatively rapid turn around time. RT-PCRs may be useful for immunocompromised individuals that have a delay in antibody response and prolonged viremia. Additionally, VRDL uses molecular methods to rule out enterovirus.

Confirmation of results

Plaque reduction neutralization test (PRNT)

Once VRDL has an initial positive result, further testing may be done to confirm that the infection detected is West Nile virus. WNV is a flavivirus, which can be problematic as far as cross-reactivity with other flaviviruses. The flaviviruses include St. Louis encephalitis (SLE) and Japanese encephalitis (JE) viruses, both of which are closely related to WNV, as well as yellow fever (YF) and dengue (DEN) viruses. People who have been recently vaccinated for JE or YF, or who have a recent exposure to JE, YF, SLE, or DEN viruses, may have a positive MAC-ELISA for WNV, even though they have not actually been exposed to WNV.

Additional laboratory testing may be required to rule out the false-positive reactions that result from an exposure to a related flavivirus. The PRNT is the most specific test available for distinguishing between and among the arthropod-borne flaviviruses. Because exposure to other flaviviruses is possible in many areas of WNV activity, initial IgM-capture Enzyme Linked Immunosorbant Assays (MAC-ELISA) positive results may need to be confirmed by PRNT. The PRNT usually takes up to 8 days if testing for both WNV and SLE viruses is required. The process may take even longer if testing with YF or Dengue viruses is necessary. This additional testing (e.g., the PRNT) may require growth of the virus and may take a week or more (plus shipping time) to conduct.

Tests in development

The VRDL is in the process of developing tests for more rapid confirmation of WNV, e.g. the Western Blot. Additionally, although results are not reported, the VRDL provides avidity testing to help ascertain the binding strength of antibodies (a low avidity index is consistent with a recent or current infection).

Appendix F: Revised National Surveillance Case Definition: Domestic Arboviral Disease

West Nile virus infection (neuroinvasive disease, fever, and asymptomatic infection) is reportable to DHS under Title 17 of the California Code of Regulations. Below is the summary statement by the Council of State and Territorial Epidemiologists (available at <http://www.cste.org/ps/2004pdf/04-ID-01-final.pdf>) including the case definition for West Nile neuroinvasive disease, followed by the case definitions for West Nile fever and West Nile infection.

CASE DEFINITION: Neurotropic Domestic Arboviral Diseases

Clinical description

Arboviral infections may be asymptomatic or may result in febrile illnesses of variable severity sometimes associated with central nervous system (CNS) involvement. When the CNS is affected, clinical syndromes include aseptic meningitis, myelitis and encephalitis, which are clinically indistinguishable from similar syndromes caused by other viruses. Arboviral meningitis is usually characterized by fever, headache, stiff neck, and pleocytosis in cerebrospinal fluid. Arboviral myelitis is usually characterized by fever and acute limb paresis or flaccid paralysis. Arboviral encephalitis is usually characterized by fever, headache, and altered mental status ranging from confusion to coma with or without additional signs of brain dysfunction. Less common neurological syndromes can include cranial and peripheral neuritis/neuropathies, including Guillain-Barré syndrome.

Non-neuroinvasive syndromes caused by these usually neurotropic arboviruses can rarely include myocarditis, pancreatitis, or hepatitis. In addition, they may cause febrile illnesses (e.g., West Nile fever [WNF]) that are non-localized, self-limited illnesses with headache, myalgias, arthralgias, and sometimes accompanied by skin rash or lymphadenopathy. Laboratory-confirmed arboviral illnesses lacking documented fever can occur, and overlap among the various clinical syndromes is common.

Clinical criteria for diagnosis

Cases of arboviral disease are classified either as neuroinvasive or non-neuroinvasive, according to the following criteria:

Neuroinvasive disease requires the presence of fever and at least one of the following, as documented by a physician and in the absence of a more likely clinical explanation:

- Acutely altered mental status (e.g., disorientation, obtundation, stupor, or coma), or
- Other acute signs of central or peripheral neurologic dysfunction (e.g., paresis or paralysis, nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, or abnormal movements)
- Pleocytosis (increased white blood cell concentration in cerebrospinal fluid [CSF]) associated with illness clinically compatible with meningitis (e.g., headache or stiff neck)

Non-neuroinvasive disease requires, at minimum, the presence of documented fever, as measured by the patient or clinician, the absence of neuroinvasive disease (above), and the absence of a more likely clinical explanation for the illness. Involvement of non-neurological organs (e.g., heart, pancreas, liver) should be documented using standard clinico-laboratory criteria.

Appendix F: Revised National Surveillance Case Definition: Domestic Arboviral Disease

Laboratory criteria for diagnosis

Cases of arboviral disease are also classified either as confirmed or probable, according to the following laboratory criteria:

Confirmed case:

- Fourfold or greater change in virus-specific serum antibody titer, or
- Isolation of virus from or demonstration of specific viral antigen or genomic sequences in tissue, blood, CSF, or other body fluid, or
- Virus-specific immunoglobulin M (IgM) antibodies demonstrated in CSF by antibody-capture enzyme immunoassay (EIA), or
- Virus-specific IgM antibodies demonstrated in serum by antibody-capture EIA and confirmed by demonstration of virus-specific serum immunoglobulin G (IgG) antibodies in the same or a later specimen by another serologic assay (e.g., neutralization or hemagglutination inhibition).

Probable case:

- Stable (less than or equal to a twofold change) but elevated titer of virus-specific serum antibodies, or
- Virus-specific serum IgM antibodies detected by antibody-capture EIA but with no available results of a confirmatory test for virus-specific serum IgG antibodies in the same or a later specimen.

Case definition

A case must meet one or more of the above clinical criteria and one or more of the above laboratory criteria.

Comment

Because closely related arboviruses exhibit serologic cross-reactivity, positive results of serologic tests using antigens from a single arbovirus can be misleading. In some circumstances (e.g., in areas where two or more closely related arboviruses occur, or in imported arboviral disease cases), it may be epidemiologically important to attempt to pinpoint the infecting virus by conducting cross-neutralization tests using an appropriate battery of closely related viruses. This is essential, for example, in determining that antibodies detected against St. Louis encephalitis virus are not the result of an infection with West Nile (or dengue) virus, or vice versa, in areas where both of these viruses occur. Because dengue fever and West Nile fever can be clinically indistinguishable, the importance of a recent travel history and appropriate serologic testing cannot be overemphasized. In some persons, West Nile virus-specific serum IgM antibody can wane slowly and be detectable for more than one year following infection. Therefore, in areas where West Nile virus has circulated in the recent past, the co-existence of West Nile virus-specific IgM antibody and illness in a given case may be coincidental and unrelated. In those areas, the testing of serially collected serum specimens assumes added importance.

The seasonality of arboviral transmission is variable and depends on the geographic location of exposure, the specific cycles of viral transmission, and local climatic conditions. Reporting should be etiology-specific (see below; the six diseases printed in bold are nationally reportable to CDC):

- **St. Louis encephalitis virus disease**
- **West Nile virus disease**
- **Powassan virus disease**
- **Eastern equine encephalitis virus disease**
- **Western equine virus disease**
- **California serogroup virus disease** (includes infections with the following viruses: La Crosse, Jamestown Canyon, snowshoe hare, trivittatus, Keystone, and California encephalitis viruses)

Appendix F: Revised National Surveillance Case Definition: Domestic Arboviral Disease

West Nile Fever: West Nile fever is reportable in California. The following definition is used:

West Nile fever syndrome can be variable and often includes headache and fever ($T \geq 38^{\circ}\text{C}$ or 100.4°F). Other symptoms include rash, swollen lymph nodes, eye pain, nausea or vomiting. After initial symptoms, the patient may experience several days of fatigue and lethargy. For the purposes of surveillance, an individual is considered to be a West Nile fever case if he or she has a febrile illness compatible with West Nile fever, and laboratory confirmation (as described above).

Asymptomatic West Nile Virus Infection: Asymptomatic infection with WNV, which is generally identified in blood donors, is also reportable. WNV-positive blood donors detected by blood banks are reported directly to local health departments. Blood donors who test positive for WNV may not necessarily be ill, nor will they initially have positive IgM or IgG antibody test results. Local health departments should report blood donors who meet the following criteria for being a presumptively viremic donor to CDPH-VRDL:

A presumptively viremic donor (PVD) is a person with a blood donation that meets at least one of the following criteria:

- a) One reactive nucleic acid-amplification (NAT) test with signal-to-cutoff (S/CO) ≥ 17
- b) Two reactive NATs

Additional serological testing is not required. Local health departments should follow up with the donor after two weeks of the date of donation to assess if the patient subsequently became ill. If the donor did become ill as a result of WNV infection, an updated case report form should be sent to VRDL so that the blood donor may be reclassified as a clinical case.

Note: Due to the continued risk of unintentional or intentional introduction of exotic arboviruses into the United States (e.g., Venezuelan equine encephalitis virus), or the reemergence of indigenous epidemic arboviruses (e.g., St. Louis encephalitis and western equine encephalitis viruses), physicians and local public health officials should maintain a high index of clinical suspicion for cases of potential exotic or unusual arboviral etiology, and consider early consultation with arboviral disease experts at state health departments and CDC.

Appendix G: West Nile Virus (WNV) Infection Case Report

Patient Information:

Last Name: _____ **First Name:** _____ **DOB:** ___/___/___ **Medical Rec #:** _____
Address: _____ **City:** _____ **Zip Code:** _____
Phone: Home (_____) _____ **Work (_____) _____** **Occupation:** _____
Sex: Male **Ethnicity:** Hispanic **Race:** White Asian/ Pacific Islander
 Female Non-Hispanic Black American Indian/Alaskan Native
 Unknown Unknown Unknown Other: _____

Physician Information (Mandatory):

Name: _____ **Facility:** _____
Pager/Phone: (_____) _____ **Fax:** (_____) _____ **Email:** _____
Date of first symptom(s): ___/___/___ Hospitalized **or** ER / Outpatient
If hospitalized, admit date: ___/___/___ **Discharge date:** ___/___/___ **If patient died, date of death:** ___/___/___

Clinical syndrome:

Encephalitis Yes No Unk
 Aseptic meningitis Yes No Unk
 Acute flaccid paralysis Yes No Unk
 Febrile illness Yes No Unk
 Asymptomatic Yes No Unk
 Other _____

Do the following apply anytime during current illness:

In ICU Yes No Unk
 Fever $\geq 38^{\circ}\text{C}$ Yes No Unk
 Headache Yes No Unk
 Rash Yes No Unk
 Stiff neck Yes No Unk
 Muscle pain/weakness Yes No Unk
 Altered consciousness Yes No Unk
 Seizures Yes No Unk

CSF Results	CBC Results
Date: ___/___/___	Date: ___/___/___
RBC: _____	WBC: _____
WBC: _____	%Diff: _____
%Diff: _____	HCT: _____
Protein: _____	Plt: _____
Glucose: _____	

Other lab results (MRI/CT, LFTs, etc.): _____

Past medical history:

Hypertension: Yes No Unk
 Diabetes Type _____ Yes No Unk
 Other: _____

Exposures/Travel within 4 wks of onset (specify details):

Mosquito bites/exposure: Yes No Unk
 Traveled outside of California: Yes No Unk
 Traveled outside the U.S.: Yes No Unk
 Ever traveled outside the U.S.: Yes No Unk

Other pertinent information (specify details):

Immunocompromised patient: Yes No Unk
 Yellow fever vaccination: Yes No Unk
 Date: ___/___/___
 Donated blood: Yes No Unk
 Date: ___/___/___
 Donated organ: Yes No Unk
 Date: ___/___/___
 Received blood: Yes No Unk
 Date: ___/___/___
 Received organ: Yes No Unk
 Date: ___/___/___
 Current pregnancy: Yes No Unk
 Week of gestation: _____
 If infant, breast fed? Yes No Unk
Knowledge of WNV prior to illness:
 Did patient do anything to avoid mosquito bites? Yes No Unk
If yes,
 - used insect repellent? Yes No Unk
 - drained standing water near home? Yes No Unk

Other significant history (social, family, etc.):

For questions regarding testing or specimens, call Cynthia Jean (510) 307-8606
 Fax this form to (510) 307-8599 or mail to CDPH VRDL – West Nile Virus, 850 Marina Bay Parkway, Richmond CA 94804

Appendix H: Report of West Nile Virus-Positive Blood Donor

California Department of Public Health
Viral and Rickettsial Disease Laboratory
850 Marina Bay Parkway, Richmond, CA 94804
(510) 307-8606 Fax (510) 307-8599

Report of West Nile Virus-Positive Blood Donor to the California Department of Public Health

1. Blood Collection Facility:
 - a. Name: _____
 - b. Address: _____ Zip Code _____
 - c. Telephone number: (_____) _____ - _____
 - d. Contact person: _____
2. Blood Unit Identification Number: _____
3. Date of Collection: ____/____/____
4. Donor's name: _____
5. Case identification number assigned by the blood center _____
(This tracking code should be different from the index blood unit identification number or other operational identification numbers. It is to be used to track the case investigation)
6. Donor's date of birth: __/__/____
7. Donor's gender: M/F
8. Donor's Address _____
ZIP code: _____ Tel: (_____) _____
9. This test was confirmed: Y/N If Y, confirmatory test and result: _____
10. NAT #1 S/CO: _____
11. NAT #2 S/CO: _____ (if done)
12. Blood testing laboratory (optional): Name: _____
Address: _____
Phone: (_____) _____ - _____
13. Comments _____

