

**NATIONAL ANIMAL HEALTH LABORATORY NETWORK
Information System
(NAHLN IS)**

User Guide
Laboratory Reporting
April 2009

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Change Management Table

Name	Date	ClearCase Version	Revision Notes	Change Request Number
D. Keating	07/12/06	1.0	Initial document created.	
D. Keating	11/03/06	2.0	Updates to reflect system changes	
D. Keating/ D. Lynch	02/05/07	3.0	Added new sections: Proficiency Testing, Method Repository, Alerts, Reports	
D. Keating/ R. Tith	03/21/07	4.0	Added more details associated with cURL messaging instructions; updated Lab Registry module so that it is in line with updated use cases, naming conventions and requirements	
L. Estberg	06/19/07	5.0	Extracted, reorganized and updated material appropriate for the Lab Registry Module.	
L. Estberg	7/31/07	7.0	Added Lab Reporting and User Account Management User Guide material	
S.Vogt	1/25/08	3	To be consistent with other NAHLN documents: Changed header from NAHLN Info Sys User Guide to NAHLN Laboratory Reporting User Guide. Changed document version from 7.0 to January 2008. Replaced date in footer with current date. Added a column in the Chg.Mgmt. Table for Chg.Request Number. Also moved the description of the request for VS program review of a message from the User Acct.Mgmt. Guide to this document. Along with that, added instructions to access help for NAHLN messaging.	NAHLN 00000374
S.Vogt	3/21/08	4	Clarified purpose of OID, and emphasized the need to verify that an OID wasn't already requested by someone else BEFORE proceeding to register for a new one through the OID Management system.	NAHLN 00000370
S.Vogt	3/27/08	5	Included description of the schema version currently supported, and also included list of latest changes.	NAHLN 00000213
T.Matson/ S.Vogt	3/27/08	6	Added information regarding outside message validation.	NAHLN 00000199
S.Linke/ S.Vogt	3/27/08	7	Updated NAHLN HL7/cURL Messaging instructions.	NAHLN 00000177 & NAHLN 00000212
L. Estberg/ S. Linke/ S.Vogt	11/06/08	17	1. Provide summary lists of resources and steps needed for developing the messaging data exchange interface 2. Provide VS Program specific reporting requirements	NAHLN00000678 NAHLN00000471
L. Estberg	11/19/28	20	1. Provide WS AI specific reporting requirements	NAHLN00000682
L. Estberg	12/08/28	21	1. Describe accessing and viewing results reported	NAHLN00000697
L. Estberg	12/09/28	22	1. Clarify use of the message profile ID (MSH.21) & VS Program ID (SPM.2.1.3) 2. Add diagram with instructions for creating a WS AI messaging RESULT.OBX segment for reporting results	NAHLN00000700
L. Estberg	3/9/2009	24	1. Clarify and expand information related to WS AI specimen-level interpretation and testing status & submission-level status and change in state guard conditions	NAHLN00000708
L. Estberg	4/28/2009	26	1. Update the information related to WS AI submission lifecycle state flows (Reviewed by S.Vogt)	NAHLN00000730

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1 Introduction

This NAHLN IS User Guide was developed to assist users in understanding the Laboratory Reporting system component.

1.1 Background

The National Animal Health Laboratory Network (NAHLN) program forms part of a nationwide strategy to coordinate the work of all organizations providing surveillance and testing services. The mission of this program covers the ability to:

- Provide accessible, timely, accurate, and consistent animal disease laboratory services nationwide;
- Provide laboratory data to meet epidemiological and disease reporting needs;
- Maintain the capacity and capability to provide laboratory services in support of responses to foreign animal disease outbreaks or other adverse animal health events (including bioterrorism events); and
- Focus on diseases of livestock (including exotic, zoonotic, and emerging diseases), while including diseases of all animals.

The NAHLN IT system was designed to support this mission with information system components organized as follows:

- 1) **Laboratory Registry:** Laboratories are registered in the system as part of the National Animal Health Lab Network. Information stored for each registered laboratory includes capacity and capability levels that support testing plans and strategies during both routine animal health surveillance and emergency outbreak response.
- 2) **Laboratory Reporting:** Laboratories registered in the system can submit lab reports with test results as electronic messages sent directly from their lab information systems (LIMS). The NAHLN IT system both 1) routes the lab results to appropriate USDA VS program surveillance systems and 2) stores the lab result in an integrated national data repository. The laboratory results can be viewed online over the internet with appropriate user role-based security access rights.
- 3) **Monitoring Laboratory Findings:** The laboratory findings stored in the central data repository are monitored for aberrant patterns and unexpected trends that may serve as early signals for animal disease outbreaks. This monitoring process can be configured to trigger automated notification alerts distributed to appropriate parties.
- 4) **Methods Repository:** The National Veterinary Services Laboratory NAHLN program team approves standardized, rapid diagnostic techniques used at state, regional, and national levels. Approved diagnostic methods, with full descriptions, will be stored centrally in the Methods Repository and used to validate accepted lab results submitted to the NAHLN system.
- 5) **Proficiency Testing:** The National Veterinary Services Laboratory NAHLN program team manages proficiency testing programs for state, regional and national laboratorians. This effort will be enhanced with NAHLN system features that will aid tracking due dates, sending automated notifications and managing individual test result status.
- 6) **System Management and Administration:** This component will be used to manage system user accounts, manage system configuration parameters, monitor system performance, and monitor data quality.

2 Summary list of steps needed to design and transmit a message

Below is a summary list of the steps needed. They may include references to other resources with more detailed descriptions of steps, tools and documents.

2.1 Join the NAHLN discussion forum

- Questions can be posted to the forum for direct support. System documentation is made available through the forum. Your forum account can be customized so that you can receive or disable automated notices when new postings are submitted to the forum.
- If you currently do not have an account on the NAHLN forum, please visit the following URL to register: <http://snomed.vetmed.vt.edu/nahln/forums/register.php?do=signup>

2.2 Obtain a lab facility NAIS ID

An ID assigned by the NAIS Premises ID Allocator is required for each messaging laboratory facility. This identifier and associated metadata is described in the NAHLN HL7 Implementation Guide for field MSH.4. Please contact the appropriate state authority to request this NAIS ID.

The type of identifier obtained is dependent on the type of facility primarily represented by the laboratory.

- If a NAIS non-producer participant ID is obtained the Universal ID (MSH.4.HD.2) = 2.16.840.1.113883.3.5.6.1.4
- If a NAIS Premises ID is obtained the Universal ID (MSH.4.HD.2) = 2.16.840.1.113883.3.5.6.1.1

2.3 Obtain a lab system OID

- Each State or Federal diagnostic laboratory facility to be recorded in the NAHLN IT system registry represents a set of buildings that can be identified with a postal address and physical size dimensions. Laboratory facilities may be administered under an umbrella parent laboratory system. The lab system OID is used to uniquely identify the set of laboratory facilities managed as a system and usually located within a single state. It is also used to indicate the assigning authority for lab managed entity and activity identifiers (e.g. accession, specimen).
- The AAVLS OID Management IT system can be accessed at: <http://aavld.vdl.iastate.edu/oid/search.htm>

2.4 Access lab information stored in the LIMS

- All information defined for transmission in the HL7 message needs to be identified in the LIMS (e.g. test result) or generated during the messaging event (e.g. Message ID, field constants). The data stored in the LIMS needs to be analyzed and compared to the data information required for messaging. The data access approach used to extract the data from the LIMS and identify data reporting trigger events needs to be developed.
- The Rhapsody messaging software may be used to configure automated information access.
- Resources that may be helpful for completing this step are the message schemas and the Hitchhiker's Guide to NAHLN Messaging.

2.5 Standardize required coded data elements

- Translate concepts represented with local terminology into concepts represented with a standardized terminology (e.g. name of lab test performed, test interpretation, specimen type, etc.)
- Resources that may be helpful for completing this step are the NAHLN terminology service web site, the May 2007 NAHLN Terminology Services presentation, and VS Program-specific terminology value subsets.

2.6 Implement system to stay informed of terminology updates

Terminology update notices are distributed via e-mail. These notices may occur as frequently as daily. An automated system will be used to distribute e-mail notices if at least one update has occurred in the past 24 hours. No notice will be sent that day if no updates occurred. If you would like to be added or removed from the list of e-mail addresses currently notified of updates to NAHLN messaging terminology please post a note to the discussion thread accessible at: <http://terminology.vetmed.vt.edu/nahln/forums/showthread.php?t=340>

2.7 Create the message and map the lab information

- A system needs to be configured to populate each message with information extracted directly or derived from the LIMS data.
- A system needs to be configured to generate and populate the remaining messaging data elements (e.g. message ID, date message sent, data field constants).
- The Rhapsody messaging software may be used to configure automated mapping.
- Other resources that may be useful to complete this step are the NAHLN message mapping tool, NAHLN HL7 Implementation Guide, and the Hitchhiker's Guide to NAHLN Messaging.

2.8 Create & activate a NAHLN IT lab system entry and lab facility profile

The NAHLN IT Lab Registry module is used to manage lab system entries and facility profiles.

- Registration of a laboratory facility profile first requires creation of a laboratory system record uniquely identified with a Lab System OID. This supports the ability to register multiple facilities all associated with the same Lab System OID as the central ID assigning authority.
- Conversely, creation of a laboratory system entry requires concurrent registration of at least one laboratory facility under the system. A USDA VS employee will serve the role of "NAHLN Laboratory Coordinator" and as such will be responsible for creation of laboratory system registration records and entry of the minimum data required for registration of at least one laboratory facility profile under the system created.
- All laboratory facility profiles must be initially created by a "NAHLN Laboratory Coordinator".
 - ▷ Request creation of a lab system entry and associated lab facility profile by the NAHLN Lab Coordinator (Kelly Burkhart – Kelly.M.Burkhart@aphis.usda.gov). The Lab Coordinator will need the lab system OID to create the lab system entry.
- Laboratory facility profile information can be activated for general access. Laboratory employees that serve the role of "Laboratory Facility Administrator" will be responsible for entering lab facility profile information and keeping it updated. Once created, a lab facility profile can be archived and saved for future requests to un-archive the profile. While un-archived lab profiles can be edited, they can never be deleted.
 - ▷ Obtain a user account with the Lab Facility Administrator role. This user role is meant to support maintenance of the lab facility profiles. This user account should be used to update the lab facility profile with a NAIS ID and activate the profile once the profile has been created. A NAIS ID and an activated profile are required for all messaging lab facilities.

- There are 3 NAHLN IT system environments available.
 - ▷ The testing environment can be used for the purpose of sending a training message type (MSH.11 = T).
 - ▷ The pre-production environment can be used for the purpose of sending a debugging messaging type (MSH.11=D). This debugging message type includes data directly extracted from the LIMS.
 - ▷ The production environment can be used for sending a production message type (MSH.11 = P). Each of the above steps needs to be repeated for each environment.
- Resources that may be helpful to complete this step are the NAHLN IS Lab Registry User Guide and the NAHLN IS User Account Management Guide.

2.9 Obtain a NAHLN IT user account with the File Upload User role

- The File Upload User role is used to transmit messages and access the result viewing report online. All those, and only those, results transmitted using this account can be viewed using the online report.
- This account can be LIMS-based for use by all executing the message transmission interface.
- A resource that may be helpful to complete this step is the NAHLN User Account Management Guide.

2.10 Obtain a VS Program IT system (VSLS) user account

This account may be needed to test data exchange interfaces built for reporting VS Program results. Contact the APHIS Technical Assistance Center (ATAC) 1-877-944-8457 to request a VSLS user account.

2.11 Obtain a digital certificate for transmitting messages

A locally installed digital certificate is required for sending HL7 messages to the NAHLN system. There are several ways the required certificate can be obtained:

- a. Downloaded from the “New NAHLN SSL Certificate” topic under in the NAHLN Documents Forum.
<http://vtsl.vetmed.vt.edu/forums/showthread.php?t=159>
- b. Extracted from NAHLN_Messaging_Install_v1.1.zip package found in the NAHLN Messaging cURL Example Package topic under the NAHLN Documents Forum.
<http://vtsl.vetmed.vt.edu/forums/showthread.php?t=363>
- c. If you are still unable to obtain the required SSL certificate, please Please contact a NAHLN Interface Administrator for a copy of the certificate file.
Shane Linke - Shane.G.Linke@aphis.usda.gov

2.12 Transmit and validate message

- a. It is recommended that the message be validated against the NAHLN result message schema prior to sending to the NAHLN system. This ensures proper formatting of the message prior to sending to the actual NAHLN system. XML editors such as Stylus Studio and XMLSpy have the ability to validate an XML document against a corresponding schema within the editor itself. In addition, the following web sites will allow you to validate XML documents online:
 - ▷ <http://www.xmlvalidation.com>
 - ▷ <http://tools.decisionsoft.com/schemaValidate>

- b. Configure a web service data exchange interface for transmitting messages between the lab and the NAHLN IT system.
- The receiving system for lab reporting (Rhapsody) can accept HL7 messages via a web services interface. Currently, it is deployed using the REST style of web services and operates via the PUT HTTP method. Using this approach the “File Upload User” account username and password should be sent as parameters in the HTTP header.
- ▷ URL Submit Message to NAHLN Test Server:
<https://vslabsubroutes.aphis.usda.gov/HL7ResultTest>
 - ▷ URL Submit Message to NAHLN Production Server:
<https://vslabsubroutes.aphis.usda.gov/HL7Result>
 - ▷ Representational State Transfer (<http://en.wikipedia.org/wiki/REST>)
RESTful Web services attempt to emulate HTTP and similar protocols by constraining the interface to a set of well-known, standard operations (e.g., GET, PUT, DELETE). Here, the focus is on interacting with stateful resources, rather than messages or operations.
- c. The tools used to transmit the message include cURL and Rhapsody.
- ▷ Instructions for cURL command line is provided in this document in Appendix A.
 - ▷ Contact Orion Health (support@orionhealth.com) to request the Rhapsody software and license. Please ensure your request states the license is part of the existing USDA site license/contract with Orion Health. For issues requesting the software/license or for additional questions, contact Shane Linke (Shane.G.Linke@aphis.usda.gov).
- d. Verify message acceptance and storage in the NAHLN IT system by viewing the report online.
- e. Prior to production messaging a request for semantic review is suggested for labs unfamiliar with messaging (Leah Estberg – Leah.Estberg@aphis.usda.gov).
- f. The first phase of production messaging may require duplicate reporting using both the manual data entry and electronic reporting. This will provide animal health program time to validate the accuracy of electronically reported results.

2.13 Implement a system to stay informed of message schema updates

Currently supported messaging schemas:

- Base NAHLN result reporting schema: designed such that it supports the minimum data requirements needed to report any NAHLN supported lab result. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultBase.xsd>
- Veterinary Services (VS) Classical Swine Fever (CSF) schema: is designed to support reporting VS CSF Program lab results. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultCSF.xsd>
- Wildlife Services (WS) Avian Influenza (AI) result reporting schema: is designed to support reporting WS AI lab results. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultWSAI.xsd>

3 Resources available for messaging

3.1 NAHLN IT Discussion Forum

- Access to the latest version of the resource documents available via the Resources button found from the URL: <http://snomed.vetmed.vt.edu/nahln/main.htm>
- Access to these documents requires requesting a NAHLN discussion forum account. If you currently do not have an account on the NAHLN forum, please visit the following URL to register: <http://snomed.vetmed.vt.edu/nahln/forums/register.php?do=signup>
- Messaging questions can be posted to the forum for direct support from other forum members.

3.2 NAHLN IT Help Desk

- You can submit a NAHLN Messaging Help, User Account, or Lab Registry Service Request through the help desk.
- The help desk will be notified of a service request by way of calling the APHIS Technical Assistance Center (ATAC) 1-877-944-8457, choose option 3.
- Web-site access: <http://helpdesk.aphis.usda.gov/arsys>
 - ▷ Find Frequently Asked Questions (search by product, category, keywords, or phrases).
 - ▷ Ask a Question (open a ticket) – technical support staff will reply to you by e-mail.
 - ▷ Access your account to check status of your questions, update your personal profile, etc.

3.3 The Hitchhiker's Guide to NAHLN Messaging

- This guide provides an overview of the NAHLN Messaging concepts in a language understandable by both laboratory domain experts (such as laboratory diagnosticians) and information technology experts. It aims to help the design and development of data exchange interface systems necessary for building and sending NAHLN messages directly from Laboratory Information Management Systems (LIMS).
- This document is available as a Resource document available from the URL: <http://snomed.vetmed.vt.edu/nahln/main.htm>

3.4 NAHLN 3.0 HL7 Implementation Guide

- This guide describes a data exchange protocol applicable for submitting lab results produced in a laboratory in support of animal health programs supported by the NAHLN. The reader is expected to have a basic understanding of data exchange interface concepts, HL7, data extraction, terminology standards and electronic messaging.
- This document is available as a Resource document available from the URL: <http://snomed.vetmed.vt.edu/nahln/main.htm>

3.5 NAHLN IS Lab Registry User Guide and Job Aid

- This user guide provides support for using the Lab Registry module. The job aid provides a summary description for using the Lab Registry module.
- This document is available as a Resource document available from the URL: <http://snomed.vetmed.vt.edu/nahln/main.htm>

3.6 NAHLN IS User Account Management Guide

- This user guide provides support for requesting and updating user accounts.
- This document is available as a Resource document available from the URL:
<http://snomed.vetmed.vt.edu/nahln/main.htm>

3.7 NAHLN Message Map

- A spreadsheet that aids mapping from a LIMS data structure to the NAHLN HL7 message data structure.
- This document is available as a Resource document available from the URL:
<http://snomed.vetmed.vt.edu/nahln/main.htm>

3.8 Vocabulary Value Sets

- A group of standardized terminology value sets are maintained in the NAHLN Vocabulary information system by the Veterinary Medical Informatics Laboratories (VMRCVM – Virginia Tech). Local vocabularies can be mapped to these value sets for the purpose of transmitting data using a NAHLN compatible terminology.
- Access to the value sets for Search or Download is available at the following URL -
<http://snomed.vetmed.vt.edu/nahln/main.htm>.
- VS Program-specific value subsets are provided below in this document.

3.9 HL7 Message Schemas

- An XML-based message schema provides the simple, static data requirements necessary to design the appropriate structure for a NAHLN compatible HL7 message. The dynamic data validation rules enforced by the NAHLN IT system upon receipt and processing of the message are described below and in other support documents.
- Currently supported messaging schemas:
 - ▷ Base NAHLN result reporting schema: designed such that it supports the minimum data requirements needed to report any NAHLN supported lab result. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultBase.xsd>
 - ▷ Veterinary Services (VS) Classical Swine Fever (CSF) schema: is designed to support reporting VS CSF Program lab results. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultCSF.xsd>
 - ▷ Wildlife Services (WS) Avian Influenza (AI) result reporting schema: is designed to support reporting WS AI lab results. The latest version is available at:
<http://terminology.vetmed.vt.edu/nahln/Documents/NAHLNMessageSchemas/NAHLNResultWSAI.xsd>

3.10 Tools for transmitting messages

- Rhapsody
Contact Orion Health (support@orionhealth.com) to request the Rhapsody software and license. Please ensure your request states the license is part of the existing USDA site license/contract with Orion Health. For issues requesting the software/license or for additional questions, contact Shane Linke (Shane.G.Linke@aphis.usda.gov).

- cURL
 - ▷ cURL instructions are described below in Appendix A.
 - ▷ Sample cURL messaging package and scripts are available via the NAHLN terminology services web site link:
 - <http://vtsl.vetmed.vt.edu/forums/showthread.php?t=363>

3.11 Sample Messages

Sample messages populated with realistic lab data can be found posted in some of the discussion forum threads.

4 NAHLN-specific requirements for reporting results

4.1 Standardized Values & Entity Identifiers

Standardized values must be encoded using the exact character case (many are upper case) specified in the vocabulary lists published for NAHLN data exchange interfaces. This character case requirement includes all enumerated message field values, specifically those designed to be validated by the XML schema. Entity (e.g. specimen, order) identifiers must also be specified using the exact same character case and spacing (e.g. no extra spaces can exist) as used in the receiving system (e.g. VSLS) in order to support automated linking of results to orders.

4.2 Sender Authentication

Sender authentication (username and password) is performed against the “File Upload User” account created in the NAHLN IT system, including verification of role/privileges to send messages for the lab represented in the message content (MSH.4).

4.3 Message Sending Facility (MSH.4)

Verification that the sending lab (MSH.4) is represented by an activated lab facility profile in the NAHLN IT system lab registry.

4.4 Message Receiving Facility (MSH.6)

The NAHLN result messages will be received by the facility with the NAIS ID = 0034P2K. This is a NAIS non-producer participant ID with a Universal ID (MSH.6.HD.2) = **2.16.840.1.113883.3.5.6.1.4**

4.5 Message Identifier (MSH.6)

Message Uniqueness Validation (DPR132)

▷ The message identifier (MSH.10) is system-generated and used to track which messages have been sent, received, accepted, rejected, etc. This value must be unique for each message sent based on the following concatenation MSH.3+MSH.4+MSH.10 created with proper NULL value processing.

4.6 Message Profile Identifier (MSH.21)

Usage Description (DPR133)

This field identifies the message profile used to validate the message sent. All messages sent to the NAHLN IT system can be validated against the generic, base message profile. Each VS program will also make a specialized message profile available for specialized validation if desired. The message profiles are uniquely identified with a file name that includes the version number. The message profile name currently expected in this field is the file name, including the version number, and excluding the file type extension of the profile used to validate the message sent (e.g. "NAHLNResultBasev1_0_4"). Currently only the latest message profiles released for testing or production are used to validate incoming messages in the receiving NAHLN IT system. If an updated (latest) data processing rule is not supported in an older profile version used by the sending system to validate the outgoing message, the message may be rejected.

5 VS Program-specific requirements for reporting results

5.1 VS Animal Health Program Identifier (SPM.2.1.3)

Optionality is Required – The Program identifier is required and must be stored in the SPM.2.1.3 field as the OID identifier registered in the AAVLD OID Management System (DPR127). This identifier is used to route messages to the correct VS Program IT receiving system (usually the appropriate VS Laboratory Submission IT system module) (DPR144). It is expected that a single message will only contain results for a single animal health program. That is, it is not expected that a single message will include results for both CSF and WS AI testing.

5.2 Submission/Referral ID assigned by the VS Program (ORC.4)

Optionality is Required – The Submission ID is required and must be stored in the ORC.4 field (DPR100). It is suggested that entity identifiers transferred from hand-written submission forms are transferred exactly as written (same character case, same date formatting (e.g. a calendar year specified as YY is not translated to YYYY formatting)), excluding all spaces. In general, VS Animal Health Program order/referral identifiers are often formatted as strings that consist of a "2 character state code + 2-3 character initials of specimen collector + specimen collection date (DDMMYYYY) + optional letter", but this is not enforced or followed for all submissions.

5.3 Specimen Identifier assigned by the VS Program (SPM.2.1)

Optionality is Required – The specimen identifier assigned by the VS Program is required and must be stored in the SPM.2.1 field (DPR126).

6 CSF Program-specific requirements for reporting results

6.1 CSF Program identifier (SPM.2.1.3)

The only supported ID is equal to 2.16.840.1.113883.3.5.8.3 (IR89)

6.2 Specimen identifier assigned by the CSF Program (SPM.2.1)

Optionality is Required – The specimen identifier assigned by the CSF Program is required. (DPR108)

6.3 Testing type supported (Result.OBX.3)

The PCR test for detecting CSF virus RNA is the test supported. (IR86)
Supported Value Set [44273-1] ('CSFV RNA XXX QN PCR')

6.4 Result value type supported (Result.OBX.2)

Only numeric result values are supported (it is assumed this numeric value is measured as Ct units). (IR85)
Supported value set [NM]

6.5 Result value (Result.OBX.5)

- Optionality is Conditional - If the result is available (OBX.11 is not equal to "X"), then the PCR Ct result value (OBX.5) is Required (DPR124)
- Supported Result Values [0-45] (IR90)
The result value must be equal to or greater than 0 (zero) and less than or equal to 45.

6.6 Test-level interpretation (Result.OBX.8)

- Optionality is Conditional - If the result is available (OBX.11 is not equal to "X"), then the result interpretation (OBX.8) is required. (DPR117)
- Valid interpretations are Negative, Indeterminate and Positive.
Supported Value Set [NEG, IND, POS] (IR91)
- Reporting Preliminary CSF PCR Results is supported - That is, a laboratory may report positive and indeterminate PCR results for specimens that have been forwarded to FADDL for confirmatory testing. (IR88)

6.7 PCR Ct result value to negative interpretation cross-validation

If the test name (OBX.3) represents the CSF PCR test (44273-1) and the result interpretation (OBX.8) is negative (NEG), then the result value (OBX.5) must equal 0 ('zero'). (IR93)

6.8 Indicate result is not available (Result.OBX.11)

If the result is not available, due to scenarios such as the order was cancelled or the test was performed but results could not be obtained, then set the result status (Result.OBX.11) to "Results

cannot be obtained” (X). This status will be mapped to the CSF testing result named “Not Tested” (IR64).

6.9 Valid CSF PCR NAHLN testing method (Result.OBX.17)

Only "NVSL CSF PCR" is accepted as the testing method. (IR99)

Supported value set [2.16.840.1.113883.3.5.1.7.8.2.3.1]

7 WS AI Program-specific requirements for reporting results

7.1 WS AI Program messaging rules

- **WS AI Production Readiness Assessment Step (UC34.6)**
During the initial process of ‘live’ reporting to the production environment, it is required to submit the hard copy faxed and e-mailed reports to the WS AI Program in addition to reporting the first 50 messages. Please notify WS AI Program staff and NAHLN IT project staff (Leah Estberg [Leah.Estberg@aphis.usda.gov] and Shane Linke [Shane.G.Linke@aphis.usda.gov]) prior to production messaging.
- **Reporting Partial Results (UC31.12)**
Reporting an incomplete set of the results needed to fulfill a submission in a single message is supported. Over time, the submission status will be updated to complete or finalized once the complete set of results are reported in additional messages.
- **WS AI Program Identifier (DPR135)**
Supported OID value = “2.16.840.1.113883.3.5.8.4.1” (SPM.2.1.3)

7.2 Reporting Laboratory

- **Result Reporting Lab does not match Testing Lab (UC34.1)**
If the reporting lab does not match the lab identified by the submitter as receiving the initial order or is different than the laboratory that reported a subset of results previously, then the VSLS Testing Lab will be updated with the lab facility identified as sending the message (MSH.4) in addition to updating the Lab Mismatches report.

7.3 WS AI Submission

- **Reporting Results for Submission Not Yet Entered (UC31.9)**
If a VS assigned specimen ID (SPM.2.1.1) transmitted in a message cannot be matched to an open screening testing service order (testing for the specimen is pending), then the specimen results are stored in a holding area (queue). An exception report is updated for notifying the WS AI Program that results reported for unlinked specimens are on hold until a missing submission is entered or data errors are corrected. A successful message receipt acknowledgement (AA) is returned to the reporting lab, yet all unlinked specimen results are not immediately stored in either VSLS or NAHLN. An attempt is made to detect a new entry of the specimen testing service order in VSLS at least every 24 hours. When the missing submission entry is provided, the unlinked specimen results are stored in VSLS and NAHLN data repositories.

- Acceptable Reason for Submission (IR112)
 - ▷ “Surveillance, National”
 - ▷ Valid value for PV1.OBX.5 = [N]

7.4 Specimen

- Valid NAHLN specimen types (SPM.4) mapped to WS AI program specimen types (IR101)
 - ▷ ‘Cloacal swab (specimen)’ (131000009104) = Cloacal Swab
 - ▷ ‘Tracheal swab (specimen)’ (671000009109) = Tracheal Swab
 - ▷ ‘Pooled cloacal/oropharyngeal swab (specimen)’ (30931000009104) = Oral + Cloacal (swab)
 - ▷ ‘Oropharyngeal swab (specimen)’ (661000009100) = Oropharyngeal (swab)
- Specimen Type Mismatch (UC31.4)

The lab results are accepted and stored even if the specimen type messaged doesn’t match the specimen type recorded in the submission record; the VSLS specimen type is not updated, and the specimen-type mismatch report is updated.

7.5 Result

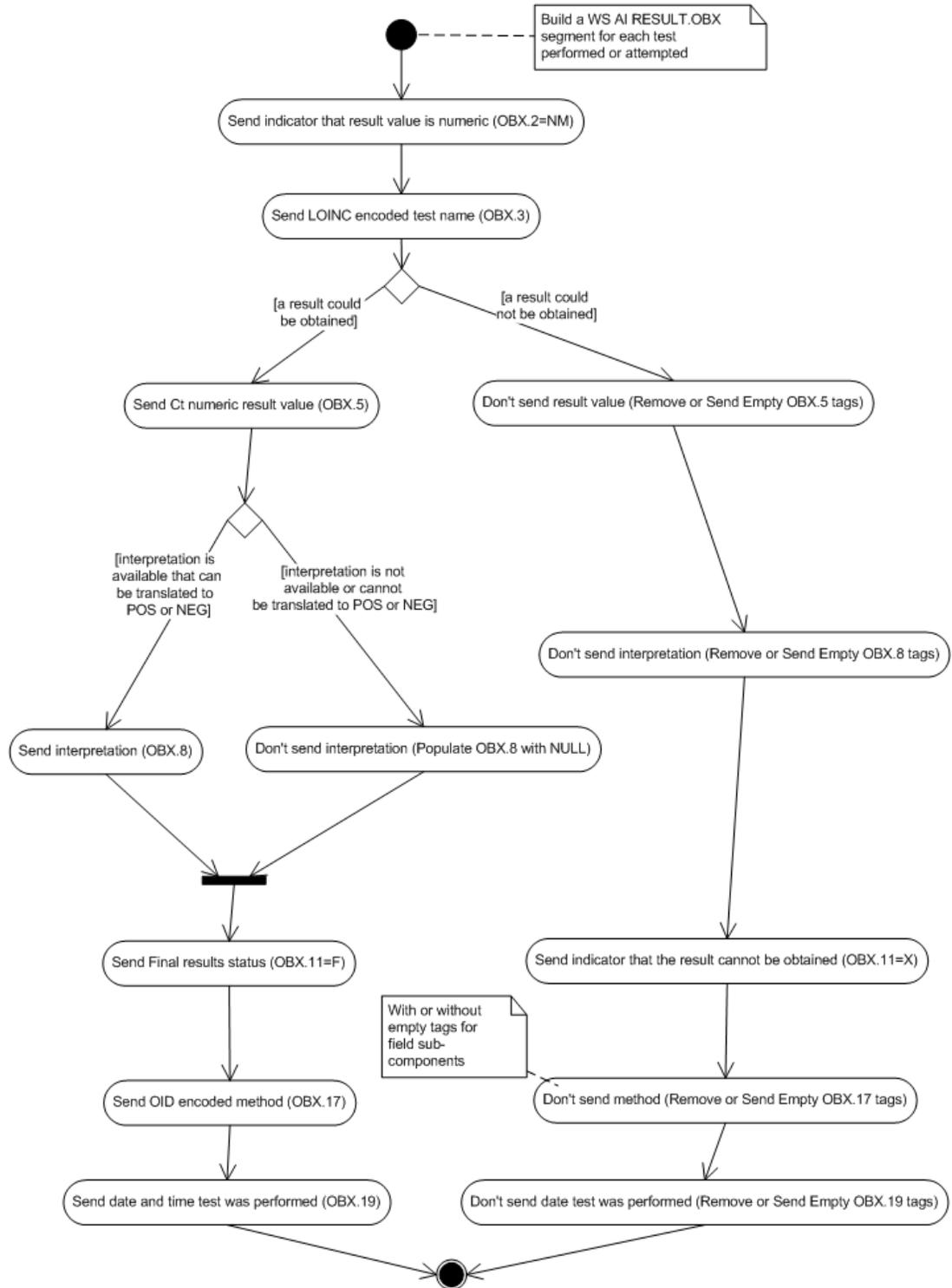
- Valid NAHLN test names (Result.OBX.3) mapped to WS AI program test names (IR103)
 - ▷ AIV Matrix RRT-PCR = FLUA RNA XXX PCR-aCnc: ‘Component: Influenza virus A; Property: Arbitrary concentration; Scale: Quantitative; Method: DNA probe with amplification’ (44263-2)
 - ▷ AIV H5 RRT-PCR = FLUA HA H5 RNA XXX PCR-aCnc: ‘Component: Influenza virus A hemagglutinin H5; Property: Arbitrary concentration; Scale: Quantitative; Method: DNA probe with amplification’ (44264-0)
 - ▷ AIV H7 RRT-PCR = FLUA HA H7 RNA XXX PCR-aCnc: ‘Component: Influenza virus A hemagglutinin H7; Property: Arbitrary concentration; Scale: Quantitative; Method: DNA probe with amplification’ (44266-5)
- Required WS AI screening PCR testing results (IR108)
 - ▷ Only the PCR Ct result values are required. The Ct value and associated PCR interpretation will be accepted and stored in the NAHLN IT data repository if provided, but the PCR interpretation forwarded to the WS AI surveillance system (VSLS) will be derived from the Ct values based on the current WS AI interpretation processing rules.
 - ▷ Result value optionality is conditional (C): If the screening PCR Ct result value is available (OBX.11 is not equal to “X”), then it (RESULT.OBX.5) must be provided (DPR129)
- Valid result value types (DPR131)

Only numeric result values are supported, the valid (RESULT.OBX.2)value set is [NM]
- Valid ranges for AIV rRT-PCR Ct result values (RESULT.OBX.5) (DPR142)
 - ▷ If the test performed is AIV Matrix RRT-PCR (RESULT.OBX.3 = 44263-2) then the value must be greater than or equal to zero and less then forty-five [0, 45)
 - ▷ If the test performed is AIV H5 RRT-PCR (RESULT.OBX.3 = 44464-0) then the value must be greater than or equal to zero and less then forty [0, 40)
 - ▷ If the test performed is AIV H7 RRT-PCR (RESULT.OBX.3) = 44266-5) then the value must be greater than or equal to zero and less then forty-five [0, 45)

- Optionality requirement for reporting screening PCR interpretations (DPR128)
If the screening PCR interpretation is available (it is stored in the LIMS, can be translated to a NAHLN compatible code, and OBX.11 is not equal to "X"), then the result interpretation must be reported. The RESULT.OBX.8 optionality is Conditional but may be Empty (CE).
- Valid values for screening PCR interpretations (RESULT.OBX.8) (DPR143)
 - ▷ Negative (NEG)
 - ▷ Positive (POS)
- Deriving the WS AI screening PCR Ct interpretation from result values (IR107)
The following rules are used to derive the PCR interpretation forwarded to the WS AI surveillance system (VSLS). Suspect or Indeterminate PCR interpretations are never derived using this data processing rule.
 - ▷ AIV Matrix rRT-PCR
 - Negative <= zero {0} Ct
 - Positive <= greater than zero and less than 45 (0, 45) Ct
 - ▷ AIV H5 rRT-PCR
 - Negative <= zero {0} Ct
 - Positive <= greater than zero and less than 40 (0, 40) Ct
 - ▷ AIV H7 rRT-PCR
 - Negative <= zero {0} Ct
 - Positive <= greater than zero and less than 45 (0, 45) Ct
- NAHLN Approved WS AI Testing Methods (IR110)
 - ▷ If the test performed is identified as "AIV Matrix rRT-PCR" (Result.OBX.3 = 44263-2), Then the valid method accepted is "NVSL AI Matrix PCR" (ISO type Result.OBX.17 = 2.16.840.1.113883.3.5.1.7.8.1.1.4)
 - ▷ If the test performed is identified as "AIV H5 rRT-PCR" (Result.OBX.3 = 44264-0), Then the valid method accepted is "NVSL AI H5 PCR" (ISO type Result.OBX.17 = 2.16.840.1.113883.3.5.1.7.8.1.1.2)
 - ▷ If the test performed is identified as "AIV H7 rRT-PCR" (Result.OBX.3 = 44266-5), Then the valid method accepted is "NVSL AI H7 PCR" (ISO type Result.OBX.17 = 2.16.840.1.113883.3.5.1.7.8.1.1.3)
- Optionality requirement for reporting the testing method (DPR97)
If the testing result is available (OBX.11 is not equal to "X"), then the testing method must be reported. The RESULT.OBX.17 optionality is conditional (C).
- Optionality requirement for reporting the testing date and time (DPR98)
If the testing result is available (OBX.11 is not equal to "X"), then the testing date and time must be reported. The RESULT.OBX.19 optionality is conditional (C).
- Reporting duplicate results for pending submission (UC31.6)
If a test result value and/or interpretation is a duplicate (it has already been manually entered or previously submitted and stored in VSLS), then the result is not updated or stored in VSLS. The remainder of the message contents are stored in VSLS and all message contents are stored in NAHLN.

- Reporting duplicate results for completed submission (UC31.8)
If one or more submission IDs (a.k.a. Group Placer ID stored in ORC.4) in the message can only be matched to a previously completed submission and all results reported in the matched submission(s) are duplicates, then the results are accepted for storage in the NAHLN repository but are not stored in VSLS. This may occur if the result was previously entered manually in VSLS yet was not reported to NAHLN.
- Reporting updated/corrected results for pending submission (UC31.6)
If a test result value and/or interpretation was previously reported, and it does not match the currently reported result, then the message is rejected as an invalid attempt to update results with the suggestion to contact the appropriate VS Program to request assistance with corrections or updates and the report is updated for notification of invalid attempt to update results.
- Reporting updated/corrected results for completed Submission (UC31.14)
If one or more submission IDs (a.k.a. Group Placer ID stored in ORC.4) in the message can only be matched to a previously completed submission and at least one of the results reported in the matched submission(s) are not duplicates, then the message is rejected as an invalid attempt to update results with the suggestion to contact the appropriate VS Program to request assistance with corrections or updates and the exception report is updated for notification of invalid attempt to update results.
The only valid result status (RESULT.OBX.11) values accepted by NAHLN are
 - ▷ F = Final results; Can only be changed with a corrected result.
 - ▷ X = Results cannot be obtained for this observation (test)
- Unexpected WS AI test reported (UC34.13)
 - ▷ If an AIV H5 or H7 rRT-PCR screening test result is reported for a specimen with a previously identified “Completed” testing status, then the testing result is only stored in the NAHLN database, not VSLS.
 - ▷ If a Matrix rRT-PCR screening test result is reported following previously submitted results for either H5 or H7 rRT-PCR screening tests, then the Matrix result is stored in both the NAHLN and VSLS databases

Building a correct messaging segment (RESULT.OBX) for reporting: See diagram below.



8 View Reported Results On-line

8.1 Access Production System Website

<https://nahln.aphis.usda.gov/nahln/Login.do>

8.2 Access Test System Website

<http://nahIntest.aphis.usda.gov/nahln/Login.do>

8.3 Access reported results on-line

- a. From the main menu select “Search Test Results”.



- b. In the Search Data form, enter the lab accession number of interest and click the Search button. It is not currently possible to search based on the Sending Lab/Facility ID.

Note: If the form is left blank (no lab accession number is provided) when the search button is clicked, all message-based reports submitted by the user will be displayed for viewing. The messages listed are ordered by date and time message was received. The latest message received is listed at the top.

Search Data

The image shows a screenshot of the 'Search Data' form. It has a title bar 'Search Data' and two input fields: 'Accession Number' and 'Sending Facility OID'. The 'Accession Number' field is highlighted in yellow and circled in red. Below the input fields are two buttons: 'Search' and 'Cancel'. The 'Search' button is circled in red.

c. In Search Data Results it is possible to display the detailed view by clicking the View action link.

Search Data

Search Data Results				
Accession #	Sending Lab	Date/ Time Message Sent	Sending User Account Name	Action
92382-08	NAHLN / NVSL	2008-07-22 14:56:09.0	tmatson	View

The initial screen from the view “Search Results” action is displayed below.

At the top of the screen you will see the contents of the Message Header (MSH) segment. This includes the name of the sending lab (facility), date & time message was sent (Date/Time of Message), etc.

Below the MSH segment view you will see the contents of the Laboratory Accession (PV1) segment. This includes the name of the diagnostician responsible for the accession (Attending Doctor) and the lab accession ID (Visit Number).

Below the PV1 segment you can navigate to information about the various roles associated with the submission, including the person or organizations submitting the laboratory request and the premises from where the specimens submitted originated. In the example screen below it is possible to navigate to and view information about the submitting party.

Below the “Submission – Roles” navigation table there is a means to navigate to the information details about the Reason for Submission.

Below the “Reason for Submission Details” navigation table there is navigation table used to access the details for each tested subject included in the lab accession. In the sample below there was a single swine subject (PID) included in the accession. It is also possible to view the information details for the responsible party (NK1) for each subject.

In the screen shot shown below, the user has navigated from the Lab Accession (PV1) segment area to the page used to view the Submission Role (ROL) information details. In this example the individual that submitted the laboratory request is identified.

USDA United States Department of Agriculture
Animal and Plant Health Inspection Service

National Animal Health Laboratory Network (NAHLN)

Home | Search Test Results | Lab Registry | Admin | Reports | Logout

Search Results > Message Header (MSH) & Lab Accession (PV1) >

Role (ROL)

Role Instance ID:
 Entity Identifier: Namespace ID: Universal ID: Universal ID Type:

Action Code: UC

Role
 ID: SUB Text: Submitting Party Coding System: HL70443

Role Person
 ID: 28115 Surname: WILSON
 Given Name: FRANK Second and Further Given Names or Initials Thereof:
 Assigning Authority: Universal ID: 2.16.840.1.113883.3.5.1.6 Universal ID Type: ISO

Person Location:
 Location Type: Location Description:
 Comprehensive Location Identifier: Entity Identifier: Universal ID: Universal ID Type:

Back

In the screen shot shown below, the user has navigated from the Lab Accession (PV1) segment area to the page used to view the details about the Reason for Submission (PV1.OBX). In this example, the testing was ordered for National Surveillance purposes.

USDA United States Department of Agriculture
Animal and Plant Health Inspection Service

National Animal Health Laboratory Network (NAHLN)

Home | Search Test Results | Lab Registry | Admin | Reports | Logout

Search Results > Message Header (MSH) & Lab Accession (PV1) >

Reason for Submission (OBX)

Value Type: CWE

Observation Identifier:
 ID: 29298-7 Text: Reason for Visit Coding System: LN

Observation Value:
 ID: N Text: Surveillance, National Coding System: L

Observation Result Status: F

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In the screen shot shown below, the user has navigated from the Lab Accession (PV1) segment area to the page used to view the details about the subject (PID) tested. This includes the animal ID, sex, and taxonomy (species, breed).

USDA United States Department of Agriculture
Animal and Plant Health Inspection Service

National Animal Health Laboratory Network (NAHLN)

Home | Search Test Results | Lab Registry | Admin | Reports | Logout

Search Results > Message Header (MSH) & Lab Accession (PV1) > lestberg

Subject (PID) Details

Patient Identifier List:

ID:	A00581060	Namespace ID:	Universal ID: 2.16.840.1.113883.3.5.1.6	Universal ID Type: ISO
Assigning Authority:		ID:		
Identifier Type Code:	TAG			

Patient Name:

Surname: NOT PROVIDED

Date/ Time of Birth:

Administrative Sex: U

Race:

Identifier:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		System:

Patient Address:

Street Address:	Street/ Mailing Address:	Other Designation:
City:	State:	ZIP:
Other Geographic Destination:	County/Parish Code:	

Patient Death Date/ Time:

Patient Death Indicator: Y

Patient Unknown Indicator:

Species Code:

ID: 78678003	Text: PORCINE, NOS	Coding System: SCT
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Breed Code::

ID:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Strain:

Production Class Code::

ID: U	Text: Unknwon	Coding System: HL70429
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Subject Observations

Observation Description	Action

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In the screen shot shown below, the user has navigated from the Responsible Party (NK1) viewing page to the page used to view the details about the specimen (SPM) collected from the subject tested.

This must include the specimen ID (Placer Assigned ID) assigned by the party that placed the testing order (e.g. VS Animal Health Program), and the specimen ID assigned by the lab (Filler Assigned ID), the specimen type, and the date the specimen was received by the lab, etc.

This may include the identifier for the VS Animal Health Program that placed the testing order (Placer Assigned Specimen ID Universal ID), the reason a specimen may have been rejected for testing, etc.

Also available is a navigation table used to access additional details for each specimen collected (Specimen Observation) and a navigation table used to access details for each testing order placed for the specimen. In this example there was a PCR test ordered for the referral COHAS12042008.

USDA United States Department of Agriculture
Animal and Plant Health Inspection Service

National Animal Health Laboratory Network (NAHLN)

Home | Search Test Results | Lab Registry | Admin | Reports | Logout

Search Results > Message Header (MSH) & Lab Accession (PV1) > Responsible Party (NK1) > lestberg

Specimen (SPM) Details

Specimen ID:

Placer Assigned ID:	Entity ID: AB25	Namespace ID:	Universal ID: 2.16.840.1.113883.3.5.8.4.1	Universal ID Type: ISO
Filler Assigned ID:	Entity ID: 1190023432-01	Namespace ID:	Universal ID: 2.16.840.1.113883.3.5.1.2.4	Universal ID Type: ISO

Specimen Parent IDs:

Placer Assigned ID:	Entity ID:	Namespace ID:	Universal ID:	Universal ID Type:
Filler Assigned ID:	Entity ID:	Namespace ID:	Universal ID:	Universal ID Type:

Specimen Type:

ID: 671000009109	Text: Traceheal swab (specimen)	Coding System: SCT
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Specimen Additives:

ID:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Specimen Source Site:

ID:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Specimen Role:

ID: P	Text: Patient	Coding System: HL70369
-------	---------------	------------------------

Grouped Specimen Count:

Specimen Description:

Specimen Collection Date/Time:
 Range Start Date/Time:

Specimen Received Date/Time: 2006-04-26 10:00:00 MDT

<

Specimen Reject Reason:

ID:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

Specimen Quality:

ID:	Text:	Coding System:
Alternate ID:	Alternate Text:	Alternate Coding System:
Original Text:		

In the screen shot below the user has navigated from the Specimen (SPM) viewing page to the page used to view the details about the Testing Service Requested (OBR & ORC) and the Lab Analysis Results (RESULT.OBX). The laboratory assigned order id (Filler Order Number), testing service ordered (Universal Service Identifier), the date and time the results were released from the lab (Result Rpt/Status Change – Date/Time) are required. This may also include the submission (referral) identifier assigned by a VS Animal Health Program (Placer Group Number). Also available is a navigation table used to access details for each testing analysis result reported. In this example, there was a single analysis result reported.

USDA United States Department of Agriculture
Animal and Plant Health Inspection Service

National Animal Health Laboratory Network (NAHLN)

Home | Search Test Results | Lab Registry | Admin | Reports | Logout

Search Results > Message Header (MSH) & Lab Accession (PV1) > Responsible Party (NK1) > Specimen (SPM) > lestberg

Test Request (OBR)

Placer Order Number:
 Entity ID: Namespace ID: Universal ID: Universal ID Type:

Filler Order Number:
 Entity ID: D060123401 Universal ID: 2.16.840.1.113883.3.5.1.2.5 Universal ID Type: ISO

Universal Service Identifier:
 ID: 44263-2 Text: FLUA RNA XXX PCR-aCnc Coding System: LN
 Alternate ID: Alternate Text: Alternate Coding System:
 Original Text:

Result Rpt/ Status Change - Date/Time 2006-04-26 05:34:00 MDT

Parent:
 Filler Assigned ID: Entity ID: Namespace ID: Universal ID: Universal ID Type:

Common Order Information (ORC)

Order Control: SC

Placer Group Number:
 Entity ID: COHAS12042008 Namespace ID: Universal ID: 2.16.840.1.113883.3.5.8.4.1 Universal ID Type: ISO

Order Status: CM

Date/Time of Transaction:

Entered By:
 ID Number:
 Family Name: Surname: Given Name:
 Assigning Authority: Namespace ID: Universal ID: Universal ID Type:

Verified By:
 ID Number:
 Family Name: Surname: Given Name:
 Assigning Authority: Namespace ID: Universal ID: Universal ID Type:

Lab Results

	Observation Description	Available Actions
1	Reason for Visit	View Observation Results

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In the screen shot below, the user has navigated from the Test Request (OBR & ORC) viewing page to the page used to view the details about a Lab Result (Result.Observation.OBX) reported.

The name of the testing analysis performed (Observation Identifier) and testing status (Observation Result Status) are among the data elements required.

If results could be obtained, then the result value (Observation Value), analysis method (Observation Method), and the date and time of the analysis (Date/Time of the Analysis) are required.

The analysis interpretation (Abnormal Flags) may also be provided.

The screenshot displays the USDA National Animal Health Laboratory Network (NAHLN) web interface. At the top, there is a header with the USDA logo and the text "United States Department of Agriculture Animal and Plant Health Inspection Service" and "National Animal Health Laboratory Network (NAHLN)". Below the header is a navigation bar with links: Home | Search Test Results | Lab Registry | Admin | Reports | Logout. The user's name "lestberg" is visible in the top right corner.

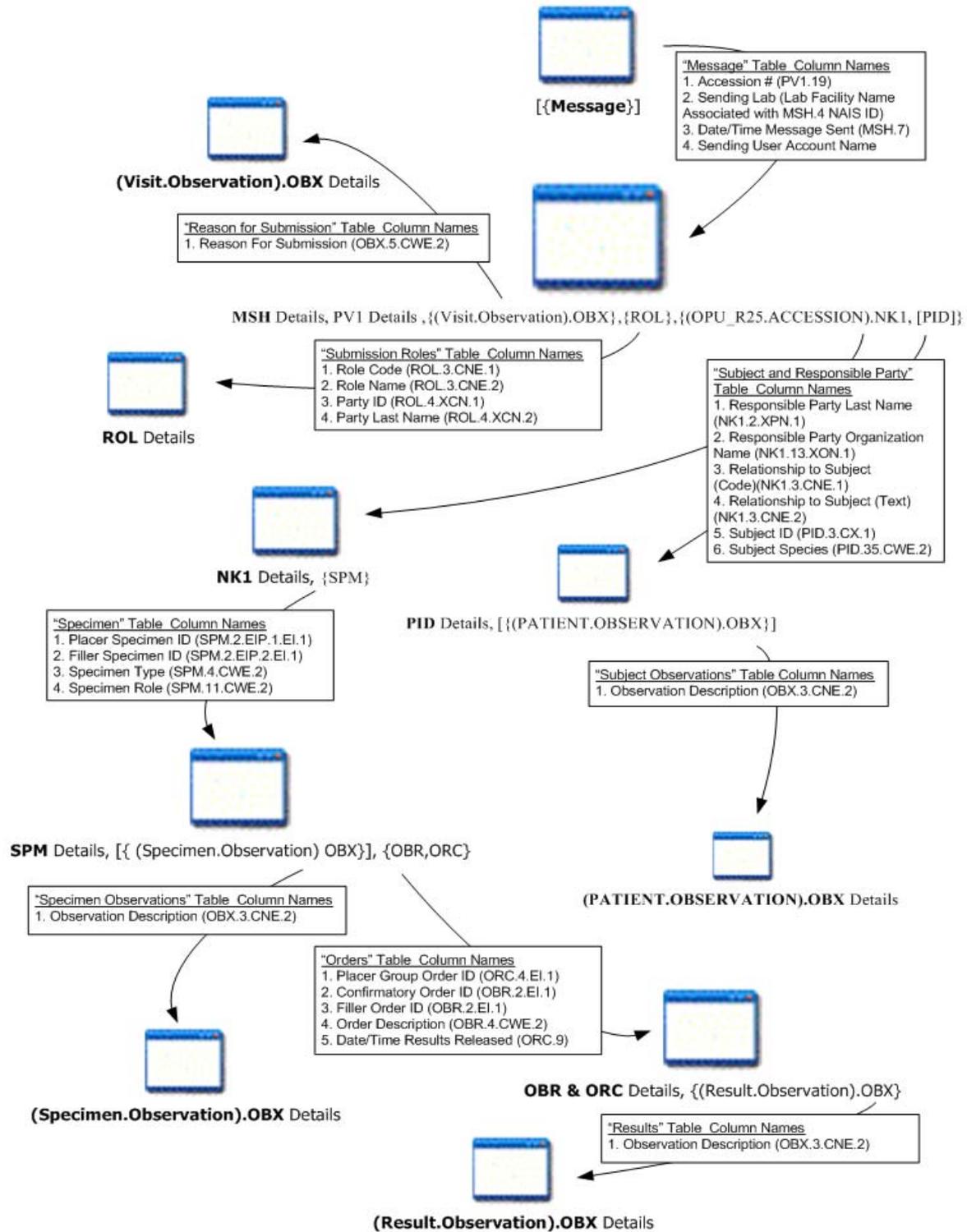
The main content area shows the breadcrumb trail: Search Results > Message Header (MSH) & Lab Accession (PV1) > Responsible Party (NK1) > Specimen (SPM) > Test Request (OBR & ORC) >. The title of the page is "Lab Results (Result.Observation.OBX)".

The data elements are organized into sections:

- Value Type:** NM
- Observation Identifier:** ID: 44263-2; Text: FLUA RNA XXX PCR-aCnc; Coding System: LN
- Observation Sub-ID:** ID: ; Text: ; Coding System: ; Alternate ID: ; Alternate Text: ; Alternate Coding System: ;
- Units:** ID: ; Text: ; Coding System: ;
- Abnormal Flags:** NEG
- Observation Result Status:** F (Final results; Can only be changed with a corrected result.)
- Date/Time of the Observation:**
- Responsible Observer:** ID Number: ; Family Name: ; Assigning Authority: ; Surname: ; Namespace ID: ; Given Name: ; Universal ID: ; Universal ID Type: ;
- Observation Method:** ID: 2.16.840.1.113883.3.5.1.7.8.1.1.4; Text: NVSL AI Matrix PCR; Coding System: ISO; Alternate ID: ; Alternate Text: ; Alternate Coding System: ; Original Text: ;
- Equipment Instance Identifier:** Entity ID: ; Universal ID: ; Universal ID Type: ;
- Date/Time of the Analysis:** Time: 2006-04-26 05:35:00 MDT

At the bottom left, there is a "Back" button. At the bottom right, the version number "version 3.9.5.3" is displayed. The footer contains links: Help | APHIS Home | USDA.gov | FOIA | Accessibility | Privacy | Non-Discrimination Statement | Information Quality | FirstGov | White House.

The following screen navigation diagram provides a high level view of the navigation paths the user can follow to visit the various messaging data segments for viewing data. The summary navigation tree provided at the top of each report page screen will provide the user with information about their current location and a means to move directly to any segment listed in the tree.



9 Glossary

Term/Acronym	Definition
AAVLD	American Association of Veterinary Laboratory Diagnosticians
ANSI	American National Standards Institute
ATAC	APHIS Technical Assistance Center
CEAH	Centers for Epidemiology and Animal Health
CSF	Classical Swine Fever
Epidemiology	The study of the incidence and prevalence of disease in large populations and the detection of the source and cause of epidemics of infectious disease.
Exotic Disease	A disease that is not native, not indigenous.
HL7	Health Level Seven is an ANSI-accredited Standards Developing Organization that develops specifications, the most widely used being a messaging standard that enables disparate healthcare applications to exchange key sets of clinical and administrative data.
LIMS	Laboratory Information Management System
NAHLN	National Animal Health Laboratory Network
OID	Object Identifier
Rhapsody	A tool that streamlines message exchange between healthcare applications, databases and external systems.
USDA	United States Department of Agriculture
VS	Veterinary Services
VSLs	Veterinary Services Laboratory Submission
WS AI	Wildlife Services Avian Influenza
Zoonotic Disease	A disease that is caused by infectious agents that can be transmitted between (or are shared by) animals and humans.

10 Appendix A: Messaging using the cURL software tool

10.1 Submit Lab Result Messages Using cURL

You can configure your system to send an HL7 lab result message with the cURL command line tool.

Installation Software Resource

Obtain the NAHLN_Messaging_Installv1_1.zip from the NAHLN Forum or from the following CEAH IT personnel:

- ▷ Shane Linke (shane.g.linke@aphis.usda.gov)
- ▷ Terry Matson (terry.h.matson@aphis.usda.gov).

The zip file contains the cURL libraries, SSL certificate and other necessary files used to send HL7 messages to NAHLN. We recommend installing cURL to a directory off a root drive of the computer used to transmit messages. Below are detailed instructions to manually install cURL.

- a) Unzip (using WinZip or WinRAR) the file called _Messaging_Installv1_1.zip to a temp directory/folder, for example, C:\cURLTemp*. You'll need to either create the temp directory or have Winzip/WinRar create it for you during the unzip process.
- b) Create a folder on the C:\ Drive (or another partition/alternate drive) to store the cURL libraries. Our example uses the NAHLN_cURL (C:\ NAHLN_cURL) directory. Copy the files unzipped in Step 2.1.1 above to this newly created folder.
- c) Delete the temporary folder that contains the unzipped files from Step 2.1.1.
- d) That's it!!! cURL is now "installed" and ready for use in sending HL7 messages to NAHLN.

Below is an example of the cURL script used to send a message to the NAHLN Test instance^{*}, followed by the script to send to the NAHLN Production instance^{**}.

Test^{*}:

```
C:\NAHLN_cURL\curl -T "E:\NAHLNTest\MyHL7XMLFile.xml" -H "username:myusername" -H "password:mypassword" https://vslabsubroutes.aphis.usda.gov/HL7ResultTest --cacert VSLabSubRoutes.cer
```

Production^{**}:

```
C:\ NAHLN_cURL \curl -T "E:\NAHLNProd\HL7\MyHL7XMLFile.xml" -H "username:myusername" -H "password:mypassword" https://vslabsubroutes.aphis.usda.gov/HL7ResultTest --cacert VSLabSubRoutes.cer
```

Breakdown of cURL script elements

If you are using cURL the syntax/order of the script below should remain the same. You will just need to swap out values for what is necessary for your labs configuration. Use the superscripts found in the following cURL example for a quick reference to the element in the command line:

```
C:\NAHLN_cURL\curl1 -T2 "E:\HL7\BSE\Any.xml3" -H4 "username5:myusername6" -H7 "password8:needpassword9" https://vslabsubroutes.aphis.usda.gov/HL7ResultTest10 --cacert11 VSLabSubRoutes.cer12 -o "C:\NAHLN_cURL\Output\MyACKOutput.xml13" -D "C:\NAHLN_cURL\Output\MyHeaderOutput.txt14"
```

¹ – command line to call cURL.exe. Two options for calling the cURL executable. First, as in the above examples, by giving the full path to cURL.exe, ie C:\NAHLN_cURL\cURL. Or change directories (cd command) so you're in the folder where cURL.exe resides before running the script. If you choose the later, your script would go from

D:\WAHLN_cURL\curl -T "E:\WAHLNProd\HL7..... to just *curl -T "E:\WAHLNProd\HL7.....*

² – -T is a cURL switch that tells cURL to upload-file/transfer the file to the remote site

³ – The HL7 XML file you wish to send, ie "E:\HL7\BSE\Any.xml". This value for this element is the full path to the HL7 XML message being sent to NAHLN unless the XML file is in the same directory where cURL is running from.

⁴ – -H is a custom header to pass to the server. This is the first of 2 custom headers we use to send username and password credentials for NAHLN. Both headers must be sent with the following syntax: "**parameter:parameter_value**"

^{5/6} – is the first of the 2 custom headers. The part before the colon is the header name (username) and the value after the colon is the actual username (ie, "username:shanesuser")

⁷ – -H is the second custom header we pass to the server and represents the users password.

^{8/9} – is the second of the 2 custom headers. The part before the colon is the header name (password) and the value after the colon is the actual user's password (ie, "password:N@HLNRu1e\$").

¹⁰ – This is the URL where the HL7 result XML file will be sent. For TESTING you'll send to: <https://vslabsubroutes.aphis.usda.gov/HL7ResultTest> and PRODUCTION: <https://vslabsubroutes.aphis.usda.gov/HL7Result>

^{11/12} – --cacert <filename> This switch tells cURL which local CA certificate to verify against the server (SSL). The <filename> that follows the --cacert switch is the path and name of the certificate to use. For NAHLN, the current certificate is named VSLabSubRoutes.cer and can be obtained from the NAHLN Forum or again by contacting Shane Linke/Terry Matson. In the example above, the certificate is stored in the same directory as the cURL.exe is. You can specify a path (ie, "C:\MyCerts\VSLabSubRoutes.cer", if you want to store the cert in an alternate location. Verify the current NAHLN certificate using the following SHA1 Thumbprint (65 b1 cc a5 59 11 1a 92 07 fa 9a 47 40 b1 be 67 fe 66 0b e5) with an Expiration Date of 12/2009.

¹³ – -o <file> Write output to <file> instead of back to command prompt/screen. <file> represents that path and name of the file to output to, ie "D:\NAHLN_cURL\Output\MyHL7_ACK.xml". Note: this is output is an ACK xml file and can be saved as XML to be parsed after transmission, if necessary. Can also be saved to a different output format such as .txt.

¹⁴ – -D <file> Write the headers to a file. <file> represents that path and name of the file to output to, ie "C:\NAHLN_cURL\Output\MyHL7_HeaderOutput.txt"

****Note:** There are additional switches that can be used/configured to provide statistics (upload time), error info and numerous other pieces of data. You can see a list of available cURL switches by running the curl command **curl -help** from working directory of curl.exe.