

10-1

QA/QC: Review Aggregate Failure

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Overview

In response to encouragement by the Federal Highway Administration, NCDOT has implemented several Quality Assurance/Quality Control (QA/QC) programs. These programs base the final acceptance of material used in construction projects on the cumulative and comparative results of QA/QC and RA (Roadway Assurance) samples.

QC samples are taken and tested by the producers, and the test results submitted to NCDOT. In addition, the Materials Inspector will be responsible for retrieving samples from the producer and delivering the sample to the QA Lab for QA testing.

As part of the Federal requirements for all QA/QC programs, dispositions on QA/QC samples that fail to compare favorably must be documented. This functionality is now available (*aggregate materials only*) in HiCAMS and will enable the RE and the QA Engineer to record the final disposition of failing samples, and have that data available for Federal highway audits and internal reviews.

Security

- ◆ Materials Inspector - enter data into the *Explanation* field associated with a QC or QA sample.
- ◆ QA Engineer - Enter notes, change status in the **Review Aggregate Failure** window. The QA Engineer can also send a notification to other users for a problem instance.

Note: *The QA Engineer can also edit the specs for QC samples, similar to the existing specs of QA samples in the HiCAMS Test Formats module. In addition, the QA Engineer can edit the specs for the QA/QC comparison columns.*

- ◆ All other users – view, print.

Workflow for QA Engineer

When the QA Engineer retrieves the QA/QC Failure listing, the list consists of failed tests from all locations. The list can be sorted and sub-sorted by any of the columns.

The listing includes all failed tests with status “Explained”, “Pending”, and “Reviewed – Disagree”. Upon review of a problem, the QA Engineer has the ability to change the status to “Reviewed – Agree”, to complete the disposition of the test results. Alternatively, the QA Engineer can decide to keep the current status and contact the Materials Inspector (or a producer) to obtain additional information about the test result before making a new status determination.

The QA Engineer can also send a notification based on the current problem. The notification may have several recipients. The recipients can attach a note to the problem instance describing their action based on the notification.

Workflow for M&T Inspector

When the Material Inspector retrieves the QA/QC Failure listing, the list consists of problems from only those locations for which he is responsible. The list can be sorted and sub-sorted by any of the columns.

The Materials Inspector can add a note for each problem, describing the nature of the problem, and any proposed solution.

Validation Process Summary

Sample Results Range Validation

Sieve sample results are compared to the upper and lower limits (“specs sheet”) for the Material as specified in the Test Formats table. If a record’s results fall outside the defined acceptable range, that status is set to “Pending”.

QC Sample Moving Average Validation

Each QC test result is included in a moving average of the last five test results of the same Facility, Material, and Size. If the moving average goes beyond the lower and upper limits specified in the Sieve Limits table at any time, the status is set to “Pending”.

QA/QC Sample Precision Validation (Mismatch)

Only QA sample results that have been set to a status of “Authorized” will be included in the QA to QC sample comparison process.

The criteria used to match the samples is by Sample ID (QA1 to QC1). The samples also matched by Facility Number, Material Code, Stockpile Number, and Sample Number.

If the difference between the QA result and the QC result falls outside the acceptable sieve range specified in the Sieve Limit table, the test will be tagged with a failure type of “Mismatch”.

Process to Review QA & QC Sample Tests

The system will compile the list of failed QA/QC tests (currently only for Aggregate materials - subsequent HiCAMS releases will include others). HiCAMS will track these failed tests until the QA Engineer updates the status to “Reviewed – Agree”.

Any new problem instance will be assigned an initial status of “Pending”. This status shall remain as long as the explanation field is empty. Any “pending” status will remain part of the failure listings for both the QA Engineer and the assigned Materials Inspector.

The status of a problem instance will change to “Explained” when a comment is entered into the explanation field. The failed test will continue to be displayed in the problem listings for both the QA Engineer, but will be removed from the problem listing for the Materials Inspector.

At the time the QA Engineer reviews the comment made by the Materials Inspector and finds the explanation satisfactory, he can assign a status of “Reviewed – Agree”. Once a test is changed to this status, it will be *removed* from all problem listings.

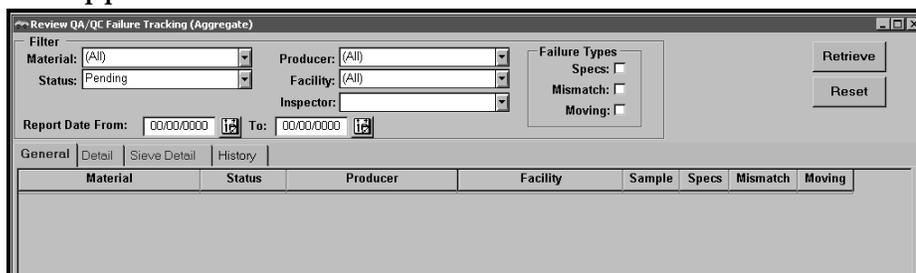
If the QA Engineer reviews the comments and disagrees with the explanation, a status of “*Reviewed – Disagree*” will be assigned to the test. The test will remain in the problem listing for the QA Engineer, and be re-added to the problem listing for the Materials Inspector until a satisfactory explanation is given.

To access the **Review Aggregate Failure** window:

Step 1: Logon to HiCAMS and select **Functions**→**QAQC**→**Review Aggregate Failure**

Note: To further aid in the retrieval of an EXISTING report, there are filtering tools available in HiCAMS. These filter functions are especially helpful when choosing from a very large listing of reports..

Step 2: The **Review QA/QC Failure Tracking (Aggregate)** window appears:



Material	Status	Producer	Facility	Sample	Specs	Mismatch	Moving
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To search the list of failing tests, use the *Filter* section at the top of the window. Initially, the *Status* field will be set to “Pending”. You may choose another status by using the drop down menu to select.

You may further define your search by selecting those *Failure Types* (Specs, Mismatch, Moving) you would like to view.

Step 3: To view those test results that have not yet been reviewed for disposition, click the **Retrieve** button:

Review QA/QC Failure Tracking (Aggregate)

Filter
 Material: (All) Producer: (All) Failure Types: Specs: Mismatch: Moving:
 Status: Pending Facility: (All) Inspector: (All)
 Report Date From: 00/00/0000 To: 00/00/0000
 Hide QAs

General | Sieve Detail | Results | History

Material	Status	Producer	Facility	Sample	Specs	Mismatch	Moving
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC27	Specs		Moving
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC26	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC29	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC24	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC23	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC-32	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Waynesville Quarry - Wayne	QC-7	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC-36	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC-33	Specs		
Coarse Aggregate, #78M	Pending	Harrison, Inc.	Franklin Quarry - Franklin	QC-44	Specs		
Coarse Aggregate, #57	Pending	Harrison, Inc.	Cherokee Quarry	QC-22	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC-30	Specs		
Coarse Aggregate, #67	Pending	Harrison, Inc.	Hayesville Quarry - Hayesville	QC-31	Specs		

Inspector: Wallace R Robert Sample: QC27 Resubmitted: No
 Report Date: 09/10/2001 Sampled By: Passed: Yes
 Material Size: CA67 Tested By: Sample ID:
 Quantity: 1000 Contract:
 Producer's Note: Project(s):

A list of all failed QA and QC test results will display in the **General** tab.

Note: Use the column headers to further sort the list. Additionally, you may more easily view the QC test results, click the "Hide QAs" radio button, and only QC results will display.

The following fields will populate for each row as selected in the General tab:

- ◆ Inspector – for QC samples, this would be the Producer's QC Inspector. For QA samples, this would be the DOT materials inspector assigned to the plant.
- ◆ Report Date – date report generated.
- ◆ Material Size – populated from QA sample detail. (Industry standard code for the material – both QA & QC).
- ◆ Quantity – quantity of material sampled.
- ◆ Producer's Note – for QC tests, any comments made by the producer when entering test results.
- ◆ Sample – Sample Number (samples are numbered consecutively per each calendar year – QA1, QC1, etc.)

- ◆ Sampled By – populated from QA sample detail. For QC, would be the QC inspector number; for QA, the Materials Inspector name will be displayed.
- ◆ Tested By – For QC, the Plant Technician number will display; for QA, the Lab Technician name will be displayed.
- ◆ Contract – contract number associated with sample (if applicable).
- ◆ Project(s) – any specific project numbers as entered by the inspector.
- ◆ Resubmitted – If the sample results have been edited and subsequently resubmitted after initial submission and review, this field contain a “Yes” status.
- ◆ Passed – If QC Sample results, this status is completed via the producer’s report, and may indicate a status of “Yes”. When validated in HiCAMS, however, the sample may fail, and will therefore appear on the problem list.

Step 4: To review the details on a failed test, select the **Sieve Detail** tab:

The screenshot shows the 'Review QA/QC Failure Tracking (Aggregate)' window. At the top, there are filter options for Material, Status, Producer, Facility, and Inspector, along with Report Date range and checkboxes for Failure Types (Specs, Mismatch, Moving) and Hide QAs. The 'Sieve Detail' tab is selected, displaying a table with columns: Sieves, QA, QC, LSL, USL, QA-QC, and Range. To the right of the table is a metadata panel with fields for UOM, Sample ID, Stockpile #, Sampled By, Tested By, Report Date, and Contract #.

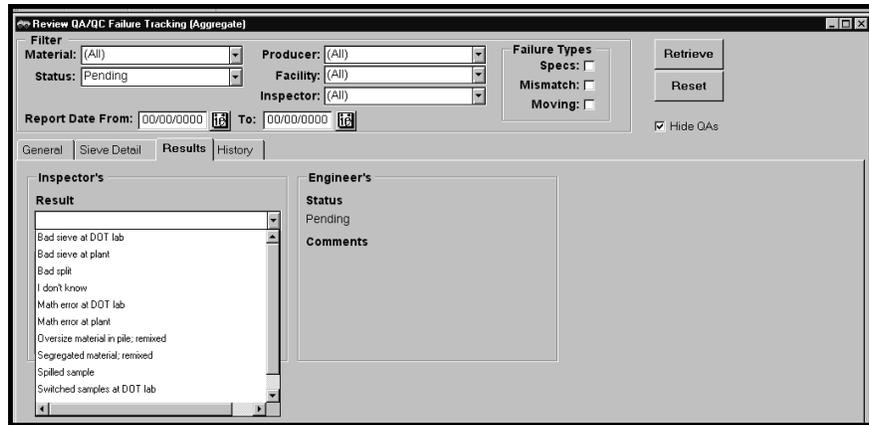
Sieves	QA	QC	LSL	USL	QA-QC	Range
2"						
1.5"		100	100	100		
1"		94	75	97		4
3/4"						
1/2"		71	55	80		5
3/8"						
#8		44	35	55		6
#8						
#10		25	25	45		5
#16						
#30						
#40		14	14	30		5
#50						
#80						
#100						
#200		7	4	12		3
#40@		54	40	84		6
#200@		27	11	35		5

UOM: English
 Sample ID:
 Sample: QC 104
 Stockpile #:
 Sampled By:
 Tested By:
 Report Date: 08/17/2001
 Contract #:
 QC ID: 3915

Note: See *Validation Process Summary* above for more information.

Step 5: To enter (security permitting – M&T Technician) or view any notes on the failed test, select the **Results** tab.

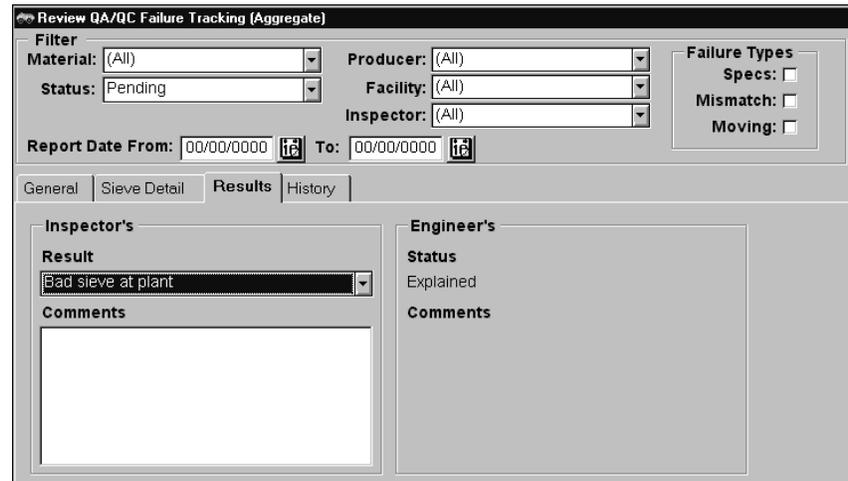
Step 6: Select a description from the “Quick Entry” list of the problem by clicking the drop down menu:



Note: The Quick Entry lists will vary depending upon security (technician or engineer), test type (QA or QC).

Step 7: Make additional comments as necessary.

Step 8: Click **Save** icon on the toolbar. The Status will change to “Explained”:



Step 9: Next, the QA Engineer can log in and search for those failed tests that with a status of *Explained*, and enter a comment (based upon security) regarding the resolution of the test failure and change the status:



Once the status is changed and the record is saved, the failed test results will be removed from the list.

Corresponding to the HiCAMS standard, the system tracks the date and the user of the last update to data in the **History** tab.

Standard Reports

There are several standard reports available for QAQC. To access these reports, select **Inquiries** ® **Standard Reports** from the HiCAMS Menu. Select the desired report from the list.

- ◆ QAQC Yearly/Quarterly Report - Presents the test results of the recorded samples for each quarry. Data is recorded for each standard sieve. Min, Max, Average, and Standard Deviation are computed. A summary for each manufacturer is computed.
- ◆ Unprocessed QA Samples Report - Generates a report that lists those QA tests that have not been matched against corresponding QC tests through the automated nightly batch process. This report will provide QA lab personnel with the ability to manually track those QC tests that will require some interaction to correlate the appropriate tests.