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INSPECT sample tracking system

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Coronavirus Method Development Community

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ABSTRACT

A specimen to data tracking tool for SEARCH SARS-CoV-2 tests. The application is used by SEARCH technicians to track samples as they proceed through each step within the RT-qPCR testing workflow. The app is currently hosted here: http://inspect-covid.com/qpcr_records/

EXTERNAL LINK

<https://github.com/SEARCH-Alliance/inspect.git>

DOI

[dx.doi.org/10.17504/protocols.io.bis8keh](https://doi.org/10.17504/protocols.io.bis8keh)

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EXTERNAL LINK

<https://github.com/SEARCH-Alliance/inspect.git>

KEYWORDS

INSPECT, Sample Tracking

LICENSE

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SAFETY WARNINGS

INSPECT makes certain assumptions about plate format and automation at each step of the workflow :

- 1) INSPECT expects 96-well plates for the Sample and RNA extraction steps and 384-well plates for the RT-qPCR reaction steps.
- 2) Sample plating is not automated and performed manually. Technicians must follow the prompted order of sample plating to maintain data integrity within INSPECT
- 3) RNA Extraction, RNA plate compression and RT-qPCR reaction plate preparation are automated using

Kingfisher, EpMotion and Mosquito robots / machines. This permits INSPECT to transition well IDs from one plate to another in specific orders as followed by the machines.

4) Only 1 decision review is permitted per plate.

Before Starting

1

Before starting ensure that the INSPECT system is publicly accessible and that you are registered on the INSPECT user list.

Sample Extraction and Plating

2

Freshly received samples can be registered into INSPECT by scanning the 2D sample tube barcode into the system. This is performed in conjunction to the sample extraction and plating step.

3

Enter the Lot # of the RNA Lysis buffer being used. The Lot # can also be scanned into the app. Enter the name of the assisting technician (if any).

Submission form for recording the RNA lysis buffer lot #

4

Start sample plating by using the platemap guides provided by INSPECT.

4.1 Load control samples first. INSPECT assumes that the control samples are being loaded in well A1 and

H1.

Initial sample plating window. INSPECT prompts user to load the control samples first into wells A1 and H1.

4.2 Scan sample barcode into the provided text area and load sample into the assigned well.

Input Sample Plate

Instructions

Scan sample barcode and load sample into the indicated well below.

Well: **B1**

Sample Barcode* Next Well End Plate

Plate Legend

- Sample
- Control
- Current Sample
- Loaded Samples

Scanned Barcodes

Well	Barcode
------	---------

Scan sample barcode and load sample into assigned well (B1, in this case)

Input Sample Plate

Instructions

Scan sample barcode and load sample into the indicated well below.

Well: **E1**

Sample Barcode* Next Well End Plate

Plate Legend

- Sample
- Control
- Current Sample
- Loaded Samples

Scanned Barcodes

Well	Barcode
D1	XYZ125
C1	XYZ124
B1	XYZ123

Scan and load samples as guided by INSPECT. If you do not have 94 samples, you can end the sample plating step by clicking on "End Plate". INSPECT will proceed with the scanned barcodes only.

- Once all samples have been plated, end the sample plating step and proceed to the plate barcode scanning step. INSPECT requires the user to enter the Sample Extraction Plate (SEP) barcode. Additionally, if present, users can enter the Sample Storage Plate (SSP) and Sample Storage Bag (SSB) barcodes as well.

INSPECT Home Search Dashboard

Scan Plate Barcodes

3 Samples

Instructions

Scan the following plate barcodes.

Sample Storage Plate Barcode* Sample Extraction Plate Barcode*

Sample Storage Plate (SSP) Scan or Enter Barcode of Sample Extraction Plate (SEP)

Sample Storage Bag*

Submit

SSP, SEP and SSB barcode submission form

INSPECT Home Search Dashboard ssathe

Reminder: Add MS2 PHAGE.

MS2 Phage Lot #* KingFisher ID*
Enter MS2 Control Lot # Enter KingFisher Number

RNA Extraction Kit Lot #* Magbind Particles CNR Lot #*
Enter RNA extraction kit lot # Enter Magbind particles CNR Lot #

Carrier RNA Lot #*
Enter Carrier RNA Lot #

Reminder: RNA Elution Plate ID will be recorded as the RNA Storage Plate ID.

Sample Extraction Plate Barcode*
Scan or Enter Barcode of Sample Extraction Plate (SEP)

RNA Elution Plate Barcode*
Scan or Enter Barcode of RNA Elution Plate (REP)

Assign Plates

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Submission Form to assign REP to an existing SEP

7.3

INSPECT Home Search Dashboard ssathe

RNA plates added successfully

Overall Testing Summary

Number of Samples	Number of Positives	Number of Negatives	Number of Undetermined
12105	1410 (11.65%)	9856 (81.44%)	507 (4.68%)

Sample Tracker

Step Name	Number of Samples in Step	Number of Plates Already Evaluated	Evaluated Plate IDs
Unprocessed Samples	0	-	-
Sample Extraction Plate (SEP)	0	0	SEP-0001
RNA Elution Plate (REP)	3	1	REP-0001
RNA Working Plate (RWP)	0	0	-
Running qPCR Plate (QRP)	0	0	-
Recorded qPCR Plate (QRP)	0	-	-
Processed qPCR Plate (QRP)	0	-	-

Provided with valid barcodes, INSPECT will link the given REP with the corresponding SEP entered in the form

- 7.4** INSPECT assumes that the RT-qPCR test is performed on a 384-well plate format. For this purpose, 4x 96-well plates are compressed into a single 384-well plate. Thus, each 384-well RNA Working Plate (RWP) must be linked with 4x 96-well REPs, and the well ID for each sample must be transformed into a 384-well plate format. This process is automated by INSPECT and can be achieved by simply scanning the new RWP and the associated REPs

INSPECT Home Search Dashboard ssathe

EpMotion ID*
Enter EpMotion ID

First 96-Well Plate in Array Position B2* Second 96-Well Plate in Array Position B3
Enter REP Barcode Enter REP Barcode

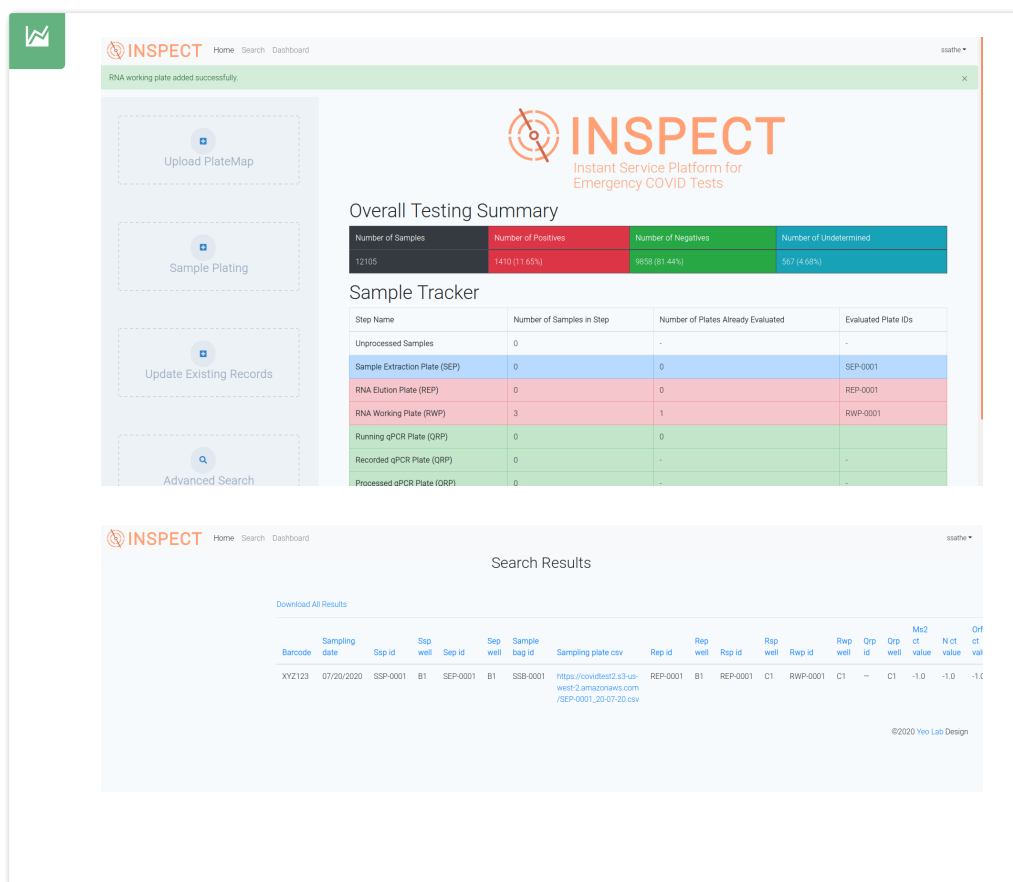
Third 96-Well Plate in Array Position B4 Fourth 96-Well Plate in Array Position B5
Enter REP Barcode Enter REP Barcode

RNA Working Plate Barcode*
Scan or Enter Barcode of RNA Working Plate (RWP)

Assign Plates

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7.5



Viral Gene Expression Test

- 8 Similar to previous steps, each qPCR Reaction Plate (QRP) must be linked to an existing RWP. Since the RWP and the QRP have the same platemap format, the well ID for each sample is carried over from the previous assignment.

8.1 Enter a valid RWP barcode and the new QRP barcode

INSPECT Home Search Dashboard

RNA Working Plate Barcode*

RWP-0001

Scan or Enter Barcode of RNA Working Plate (RWP)

qRT-PCR Plate Barcode*

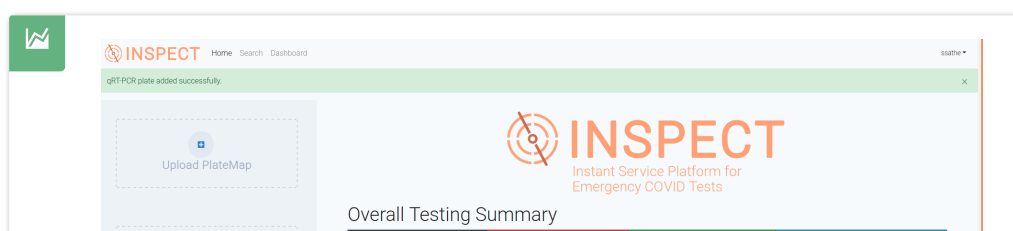
QRP-0001

Scan or Enter Barcode of qRT-PCR Reaction Plate (QRP)

Assign Plates

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8.2



Sample Plating	Number of Samples 12105	Number of Positives 1410 (11.65%)	Number of Negatives 9658 (81.44%)	Number of Undetermined 567 (4.68%)
Update Existing Records	Sample Tracker			
Advanced Search	Step Name	Number of Samples in Step	Number of Plates Already Evaluated	Evaluated Plate IDs
	Unprocessed Samples	0	-	-
	Sample Extraction Plate (SEP)	0	0	SEP-0001
	RNA Elution Plate (REP)	0	0	REP-0001
	RNA Working Plate (RWP)	0	0	RWP-0001
	Running qPCR Plate (QRP)	3	1	QRP-0001
	Recorded qPCR Plate (QRP)	0	-	-
	Processed qPCR Plate (ORP)	0	-	-

- 8.3 After the qPCR reaction has completed, the technician is required to upload the qPCR results file. This can be done using the results submission page. The filename for the results file must be the same as the QRP barcode.

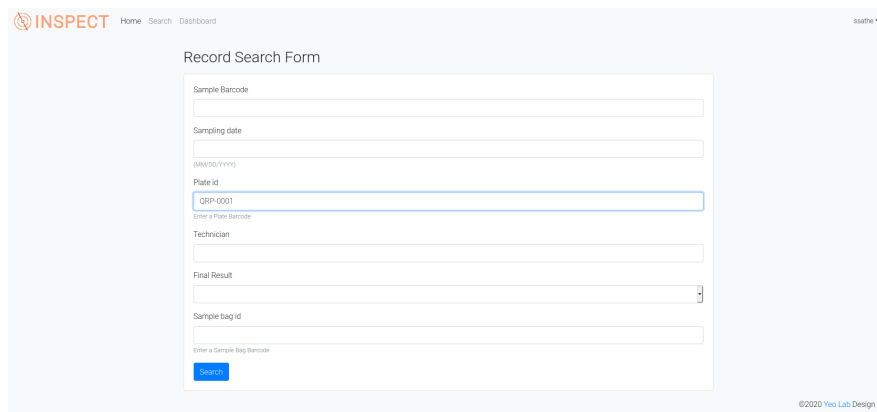
- 8.4 Once the results are successfully uploaded, INSPECT will make decision calls on each sample (during file upload). These decisions have to be reviewed by a qualified technician. On the Review Results page, enter the barcode of the QRP for which you would like to review the results.

Barcode	Fake name	Sep id	Rep id	Rwp id	Qrp id	Qrp well	Mis2 ct value	N ct value	Orf1ab ct value	S ct value	Decision tree results	Final results
XYZ124	None	SEP-0001	REP-0001	RWP-0001	QRP-0001	E1	30.787	-1.0	-1.0	-1.0	Negative	Negative
XYZ125	None	SEP-0001	REP-0001	RWP-0001	QRP-0001	G1	30.84	-1.0	-1.0	-1.0	Negative	Negative
XYZ123	None	SEP-0001	REP-0001	RWP-0001	QRP-0001	C1	31.155	-1.0	-1.0	-1.0	Negative	Negative

Default results are the same as the decisions made by INSPECT. To change the decisions, use the dropdown menu to select 1 of 4 options : Negative, Positive, Invalid and Inconclusive.

Result Reporting

- 9 Once the results for a QRP have been reviewed, the RT-qPCR testing workflow is complete. Users can search for samples and corresponding results through the SEARCH tab.



INSPECT Home Search Dashboard sathe

Record Search Form

Sample Barcode:

Sampling date:

(MM/DD/YYYY)

Plate id:

Enter a Plate Barcode

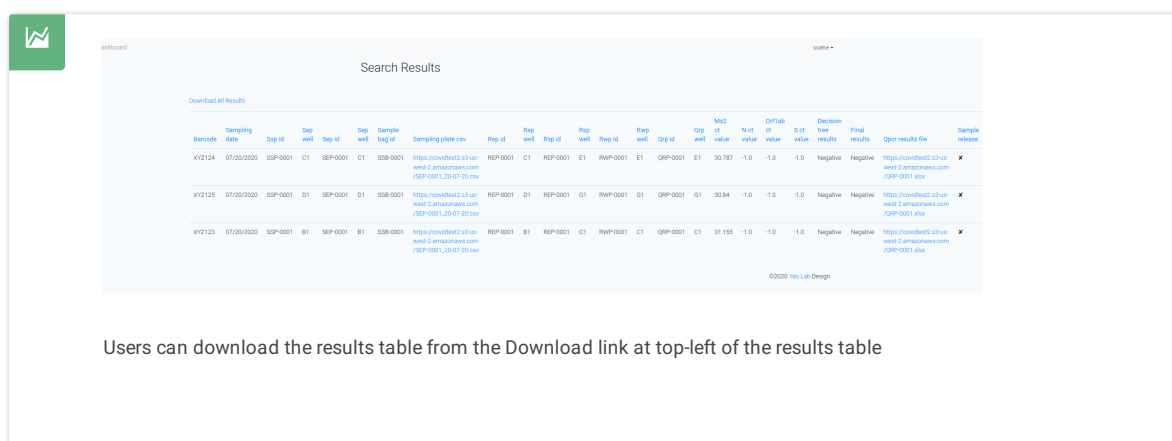
Technician:

Final Result:

Sample bag id:

Enter a Sample Bag Barcode

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Search Results

[Download All Results](#)

Barcode	Sampling date	Step id	Step well	Step id	Step well	Sample bag id	Sampling plate row	Rep id	Rep well	Rep id	Rep well	Rep id	Rep well	Rep id	Rep well	Qrp id	Qrp well	Mod ct value	N ct value	Qrtab ct value	S ct value	Decision tree results	Final results	Qcqr results file	Sample release
KY2124	07/20/2020	SEP-0001	C1	SEP-0001	C1	SBB-0001	https://covidtest2.s3.amazonaws.com/SEP-0001_20-07-20.csv	REP-0001	C1	REP-0001	E1	RWP-0001	E1	QRP-0001	E1	30.787	-1.0	-1.0	-1.0	Negative	Negative	https://covidtest2.s3.amazonaws.com/SEP-0001.xlsx			
KY2125	07/20/2020	SEP-0001	D1	SEP-0001	D1	SBB-0001	https://covidtest2.s3.amazonaws.com/SEP-0001_20-07-20.csv	REP-0001	D1	REP-0001	G1	RWP-0001	G1	QRP-0001	G1	30.84	-1.0	-1.0	-1.0	Negative	Negative	https://covidtest2.s3.amazonaws.com/SEP-0001.xlsx			
KY2123	07/20/2020	SEP-0001	B1	SEP-0001	B1	SBB-0001	https://covidtest2.s3.amazonaws.com/SEP-0001_20-07-20.csv	REP-0001	B1	REP-0001	C1	RWP-0001	C1	QRP-0001	C1	31.155	-1.0	-1.0	-1.0	Negative	Negative	https://covidtest2.s3.amazonaws.com/SEP-0001.xlsx			

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Users can download the results table from the Download link at top-left of the results table