

133 Molesworth Street PO Box 5013 Wellington 6140 New Zealand T+64 4 496 2000

15 September 2021

By email: H202110058

Tēnā koe

Ref:

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) which was transferred by Minister for COVID-19 Response, Hon Chris Hipkins, to the Ministry of Health (the Ministry) on 6 August 2021, for:

"Copies of advice provided to the Minister on the contracts for and roll out of saliva testing at MIQ by the Ministry of Health since 1 July 2021."

Seven documents were identified within scope of your request. The documents are attached to this letter and itemised below in Appendix 1. Please note that Document 3 was superseded by Document 7, but the Ministry is providing it in the interest of transparency.

I trust this information fulfils your request. Under section 28(3) of the Act you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Ministry website at: www.health.govt.nz/about-ministry/information-releases/ responses-official-information-act-requests.

Nāku noa, nā

Darryl Carpenter Group Manager, COVID-19 Immunisation, Testing & Supply **COVID-19 Health System Response**

#	Date	Title	Decision on release
1	30 June 2021	Letter to the Chairperson of the Health Select Committee regarding saliva testing	Released in full.
2	3 July 2021	Memorandum – Letter to the Chairperson of the Health Select Committee regarding saliva testing	Some information withheld under section 9(2)(a) of the Act, to protect privacy of natural persons.
3	8 July 2021	Briefing – Updated position on the testing for COVID-19 using saliva as a sample	
4	13 July 2021	Memorandum – Testing for COVID-19 using saliva as a sample – rollout plan	
5	30 July 2021	Memorandum – Saliva Testing Update	
6	30 July 2021	Saliva Testing Implementation Overview (as at 30 July 2021)	Released in full.
7	5 August 2021	Briefing – Update on the roll out of the option of saliva testing for COVID-19 to border workers	Some information withheld under section 9(2)(a) of the Act.

Appendix 1: List of documents for release



133 Molesworth Street PO Box 5013 Wellington 6140 New Zealand T+64 4 496 2000

ACT 1982

30 June 2021

Dr Liz Craig Chairperson, Health Select Committee Parliament Office Private Bag 18888 Parliament Buildings Wellington 6160

Dear Dr Craig,

On 28 June 2021 you received a letter from Dr Stephen Grice from Rako Science relating to saliva testing for COVID-19 in New Zealand, and statements made at a Select Committee appearance on 23 June 2021. I am writing to provide some contextual information for that letter, and to respond to claims that incorrect information was provided to the Committee on 23 June 2021.

Work on saliva testing to date

Work has been underway to investigate and roll out saliva testing in New Zealand for some time. Initially, available evidence had shown that testing for COVID-19 specifically using saliva as a sample was not as sensitive as using nasopharyngeal samples. This meant there was a chance that positive cases of COVID-19 could be missed. Ultimately, this could have a critical effect in the New Zealand context, where we have a very low prevalence of positive cases, and a single case can have ramifications for people and communities across New Zealand with a change in alert levels.

To further understand how testing for COVID-19 using saliva as a sample in New Zealand the Institute of Environmental Science and Research (ESR) has been endeavouring to collect paired nasopharyngeal and saliva samples from people at the Jet Park Managed Quarantine Facility who have tested positive for COVID-19. Testing of paired samples, using a variety of techniques, builds our understanding of how each sample performs against each other specifically in a New Zealand context. ESR have had difficulty in obtaining these paired samples, however, now have a pool of saliva samples which are positive for COVID-19 to support the local validation of saliva as a sample in New Zealand laboratories. These were begun to be made available to New Zealand laboratories in mid-June, with results expected by the end of July 2021.

Roll out of saliva testing for COVID-19 at the border

In May 2021, the Minister of Health announced that saliva testing for COVID-19 would be rolled out to individuals working at New Zealand borders. Workers currently on a 7day testing cycle will soon have the option of having multiple saliva tests over a fortnight, with a single nasopharyngeal swab each fortnight. A prototype of this roll out began in Canterbury in the week beginning 28 June 2021.

As giving a saliva sample is less invasive than nasopharyngeal swabbing, it can be done at increased frequencies. This gives the opportunity to increase surveillance testing at our borders and increases our chances of catching a positive case early. This is especially useful in the context of a vaccinated workforce where people are far less likely to become infected with COVID-19, and if they do, are less likely to be symptomatic and therefore unlikely to get a test.

Following an open competitive procurement process, the Ministry has partnered with Asia Pacific Healthcare Group to deliver COVID-19 saliva testing services at the border. APHG provides a wide range of pathology services to 75 percent of New Zealand's population and has a network of 25 laboratories and 150 collection centres. They have been heavily involved in New Zealand's response to COVID-19, processing a third of all tests carried out in New Zealand to date. APHG is a majority New Zealand owned company, with headquarters in Auckland.

Statements made at Select Committee on 23 June 2021

Claims have been made that statements made at the Health Select Committee meeting on 23 June 2021 were incorrect, including:

- PCR testing using saliva samples is not as accurate as using nasopharyngeal samples
- PCR testing using saliva samples is not quite as good as nasopharyngeal samples at detection of SARS-CoV-2 early on in an infection.

These statements were made on the basis of the Ministry's position at the time. Since then, science reviewed, and technical advice received has confirmed that the performance of some methods for PCR testing of saliva samples is equivalent to testing of nasopharyngeal samples. PCR testing using saliva samples can also be as good at the early detection of SARS-CoV-2 as using nasopharyngeal samples.

The Ministry had previously concluded that saliva as a sample has a role in surveillance in the New Zealand context. It is on this basis that we have a prototype underway to test the viability of rolling out PCR testing using saliva as a sample to border workers in New Zealand.

Rako Science

We are aware you have received a letter from Rako Science regarding comments made at Select Committee on 23 June 2021, and saliva testing for COVID-19 more generally.

Rako Science have made it known publicly that they submitted a response to the open competitive procurement process, and that their tender was unsuccessful. The Ministry is however not prepared to discuss the detail of the proposals of unsuccessful tenderers to maintain commercial sensitivity and protect their ability to competitively tender in the future.

Rako Science have been offering private saliva testing for COVID-19 in New Zealand since early 2021, outside of the overall public health response. Rako Science have, however, worked with the Ministry to share information regarding the test they perform, which has contributed to an improved understanding the science behind using saliva as a sample in New Zealand.

ON ACT 1982

I trust you will find this information useful.

Yours sincerely

Ør Ashley Bloomfield Director-General of Health

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Cc Prof Ian Town, Chief Science Advisor - Ministry of Health

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Memorandum

Letter to the Chairperson of the Health Select Committee regarding saliva testing

Date due to MO:	3 July 2021	Action required by:	7 July 2021
Security level:	IN CONFIDENCE	Health Report number:	HR20211516
То:	Hon Chris Hipkins, Ministe	r for COVID-19 Response	C ^A
Contact for te	lephone discussion	FORMA	IONA
Name	Position		Telephone
Sue Gordon	Deputy Chief Exe System Response	ecutive - COVID-19 Health	s 9(2)(a)
Darryl Carpenter	Group Manager	 Testing and Supply 	s 9(2)(a)

Action for Private Secretaries

N/A RELEASED

Date dispatched to MO:



Letter to the Chairperson of the Health Select Committee regarding saliva testing

Purpose

1. The purpose of this memo is to provide information regarding a letter to the Chairperson of the Health Select Committee, in response to a letter received by the Chairperson from Rako Science on 28 June 2021.

Background

2. Dr Liz Craig, Chairperson of the Health Select Committee received a letter from Dr Stephen Grice of Rako Science on 28 June 2021, claiming false and incorrect information had been provided to the Select Committee on 23 June 2021. In addition, the letter provides information outlining the science behind Rako Science's test, which has recently also been provided to the Ministry of Health.

An updated position on saliva testing is being provided to the Chairperson of the Health Select Committee

- 3. Rako Science have continued to claim that their saliva test is equivalent or better than testing using nasopharyngeal swabs, and regularly engage with the Ministry on this matter. Following a meeting with Ministry Officials and Rako Science in mid-June where evidence comparing the results of COVID-19 tests using paired nasopharyngeal swabs and saliva samples from the University of Illinois, it was agreed that the two parties would form an agreed position statement regarding saliva testing. This is still in draft form, and the Ministry awaits further feedback from Rako Science.
- 4. In addition, the wider science community is beginning to update their position regarding saliva testing. Although not yet seen as a one for one replacement of nasopharyngeal swabbing, there is increasing agreement that a saliva-only regime consisting of regular testing may be more appropriate in some surveillance settings.
- 5. Critical to this is the work by ESR to collect paired positive samples from returnees in the Jet Park Managed Quarantine Facility. To date, ESR have had limited success in collecting paired samples, however they have collected a significant number of positive saliva samples. 61 of these samples were sent to an initial four laboratories in the COVID-19 testing network for analysis on 25 June 2021.
- 6. These samples cannot answer the questions on whether saliva is as sensitive as a nasopharyngeal swab. They do however allow an understanding to be formed of the relative performance of various saliva testing methodologies employed by each laboratory. The results of this work are expected in late July, following which additional advice will be provided.



Next steps

The attached letter will be sent to the Chairperson of the Health Select Committee in during the week beginning 5 July 2021. Officials can provide further information about this topic at your request.

RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982 Sue Gordon **Deputy Chief Executive COVID-19 Health System Response** Date: 1/7/2/

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Briefing

Comment:

Updated position on testing for COVID-19 using saliva as a sample

Date due to MO:	8 July 2021	Action required by:	12 July 2021	
Security level:	IN CONFIDENCE	Health Report number	r: 20211563	
То:	Hon Chris Hipkins, Minis	ris Hipkins, Minister for COVID-19 Response		
Contact for tel	ephone discussion		ATION AC	
Name	Position	FORM	Telephone	
Shona Meyrick	Shona Meyrick Deputy Chief Executive (acting) – COVID- 19 Health System Response			
Darryl Carpenter	Group Manag	er – Testing and Supply	s 9(2)(a)	
	ERTHE	<u></u>		
Minister's officient	ce to complete:			
□ Approved	🗆 Declin	ne 🗆 No	ted	
Needs change	□ Seen		ertaken by events	
🗆 See Minister's N	Notes 🗆 Witho	drawn		

Updated position on testing for COVID-19 using saliva as a sample

Security level:	IN CONFIDENCE	Date:	8 July 2021	
То:	Hon Chris Hipkins, Mir	ister for COV	D-19 Response	0
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Purpose of re	eport			JP.

Purpose of report

1 The purpose of this report is to provide information on the Ministry of Health's (The Ministry) updated position on testing for COVID-19 using saliva as a sample.

Summary

- 2 The Ministry has been assessing the role of testing for COVID-19 using saliva as a sample for some time. By April 2021, the Ministry had become confident enough in saliva as a sample that the recommendation was made to roll it out to border workers at a higher frequency.
- 3. Since then, evidence reviewed by the Ministry further increased our confidence in testing for COVID-19 using saliva as a sample and we have revised our position to reflect this. The Ministry is now confident that in some surveillance situations, testing for COVID-19 can be carried out using saliva samples instead of nasopharyngeal swabs.
- 4. A prototype of the border work roll out is currently underway, however to date there has been very low uptake. The updated position will allow changes to be made to the prototype to improve uptake, which will inform the wider roll out testing for COVID-19 using saliva as a sample across New Zealand.

Briefing: HR20211563

RELEASE

Recommendations

We recommend you:

- a) **Note** that the Ministry has continued to assess emerging evidence and **Yes/No** information on testing for COVID-19 using saliva as a sample
- b) Note that the Ministry is increasingly confident that some methods of testing Yes/No for COVID-19 using saliva as a sample are equivalent to testing of nasopharyngeal swabs, and that it is not necessary to complement high frequency testing using saliva as a sample with nasopharyngeal swabs
- c) Note we have adjusted the prototype of testing border workers for COVID-19 using saliva as a sample currently underway in Canterbury based on the updated position, which we anticipate will increase uptake.
- d) Note the work underway that will further inform further consideration of Yes/No saliva as a sample as part of the public health response to COVID-19 in New Zealand, as well as future work on exploring a mandatory testing regime using only saliva samples

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Shona Meyrick Deputy Chief Executive (acting) COVID-19 Health System Response Date: 7 July 2021 Hon Chris Hipkins Minister for COVID-19 Response Date:

Updated position on testing for COVID-19 using saliva as a sample

Background

- 5. The Ministry of Health has been assessing the role of using saliva as a sample for testing for COVID-19 for some time. Evidence had shown that testing for COVID-19 using saliva samples was not as sensitive as nasopharyngeal swabs, meaning there was the potential for missed infections. A single missed infection could have a significant effect in New Zealand, where there is a very low prevalence of COVID-19, and potentially lead to widespread community outbreaks.
- 6. By April 2021, the Ministry had become confident enough in saliva as a sample that the recommendation was made to roll it out to border workers at a higher frequency, albeit with a regular nasopharyngeal swab to mitigate any associated risks with a lower sensitivity test.
- 7. Since then, the Ministry has continued to review emerging science and validation studies by New Zealand and overseas laboratories, which have provided further confidence in saliva as a sample. Based on these, the Ministry is updating its position on testing for COVID-19 using saliva as a sample.

The Ministry now has greater confidence in testing for COVID-19 using saliva as a sample

- 8. The Ministry has reviewed several sources of information, emerging science and validation studies that has increased its confidence, including:
 - a. International literature on using saliva as a sample literature reviewed by the Ministry's COVID-19 Science and Insights team confirmed that saliva samples perform similarly to nasopharyngeal swabs for the detection of SARS-CoV-2. Appendix One summarises two systematic reviews that are considered of sufficient quality to inform the Ministry's position and a list of the evidence reviewed.
 - b. Validation work by local laboratories New Zealand based laboratories continue their own work to validate saliva as a sample and achieve International Accreditation New Zealand (IANZ) accreditation to ISO 15189 (specifically using saliva as sample).
 IANZ has accredited 10 laboratories to ISO 15189 (specifically using saliva as a sample) at the time of writing. Validation work reviewed by the Ministry has been carried out on limited numbers of samples, and includes but is not limited to:
 - One laboratory has achieved accreditation to ISO 15189 (specifically using saliva as sample), with validation that shows 98.0% concordance with nasopharyngeal samples, a sensitivity of 96.6%, and a specificity of 98.6%. This test has received United States Food and Drug Administration Emergency Use Authorisation (FDA EUA).

- ii. Another has also achieved ISO 15189 (specifically using saliva as sample) and uses a range of FDA EUA authorised assays that are 100% specific and sensitive and demonstrated analytical equivalency between nasopharyngeal swabs and saliva samples.
- c. **Position of the New Zealand Microbiology Network (NZMN)** The NZMN released a statement in March 2021 that recommended that if introduced, regular testing for COVID-19 using saliva as a sample for surveillance among border workers should not replace nasopharyngeal swabbing already in place. The NZMN continues to discuss saliva testing and other strategies for detection of SARS-CoV-2. While the NZMN continues to support saliva testing as a surveillance strategy alongside nasopharyngeal swabs, they also support:
 - i. pilot studies to collect data on the use of frequent saliva testing in place of weekly or fortnightly nasopharyngeal swabs for border worker surveillance as modelling shows that strategy would be effective
 - ii. pilot studies to collect data on the use of saliva testing for diagnosis of symptomatic low-risk people in the community for whom a nasopharyngeal swab is not possible to collect or where barriers to symptomatic community surveillance using nasopharyngeal swabs exist.

As a result of new evidence and information, the Ministry has revised its position on testing COVID-19 using saliva as a sample

- 9. The Ministry is now confident that there are surveillance situations where testing for COVID-19 may be carried out using saliva samples instead of nasopharyngeal swabs. Such situations include:
 - a. where frequent testing of border workers can potentially identify cases earlier, before chains of transmission are generated
 - b. for low risk community patients where saliva may be a better tolerated alternative to nasopharyngeal swabs and encourage more people to get tested, thus reducing the risks of missed cases.
- 10. This supports the need for increased testing of the border workforce as they become vaccinated. There is compelling evidence that as vaccinated individuals are less likely to be symptomatic if infected, and therefore less likely to seek a test outside of the regular testing regime, it is important that the frequency of surveillance is increased.
- 11. Any diagnostic testing for COVID-19 should be done using nasopharyngeal or dual oropharyngeal / nasal swabs, as there is a potential for lower amount of RNA present in saliva or lower quality saliva samples that cannot be countered by increased frequency in a diagnostic setting. Any positive test for COVID-19 via a saliva sample will need to be confirmed via a nasopharyngeal swab.

The updated position has an impact on the prototype currently underway in the Canterbury Region

12. In May 2021, the decision was made to roll out testing for COVID-19 using saliva as a sample to those working at the border. Using saliva as a sample allows testing to be carried out more frequently, especially as border workers get vaccinated and are less

likely to be symptomatic if positive for COVID-19 and are therefore less likely to seek a test.

- 13. A prototype has been underway in Canterbury since 28 June 2021 and will run for four week. The lessons from this will inform the wider national roll out. In preparing for the prototype, persons conducting a business or undertaking (PCBUs) and workers raised several issues with the proposed regime, that ultimately have led to an expected low uptake of saliva testing. These issues include:
 - a. unwillingness of border workers to give samples outside of work hours and the impact of testing on rostered time off
 - b. concerns about lowering the efficacy of testing and increasing risk by moving away from the existing nasopharyngeal based testing regime which has been much heralded as the "gold standard"
 - c. the perception by workers on a seven-day cycle that participation in saliva testing would be a direct one for one swap of nasopharyngeal swabs for saliva tests
 - d. complex and irregular shift patterns making compliance with a higher frequency testing regime difficult for border workers
- 14. The updated position will however enable changes to be made to the wider roll out to improve the uptake of testing for COVID-19 using saliva as a sample, by removing the need for a nasopharyngeal swab and simplifying the testing regime.
- 15. The Ministry is preparing additional advice on a change to the COVID-19 Public Health Response (Required Testing) Order 2020, for the purposes of the prototype only, to put in place a saliva-only regime and remove the requirement to have a regular nasopharyngeal swab. A briefing and draft amendment order will be provided in the week beginning 19 July 2021.

Other work is underway that will further inform the utility of testing for COVID-19 using saliva as a sample as part of the public health response in New Zealand

16. This includes:

b.

- a. **The Surveillance Strategy** the current review will recommend that we dynamically change surveillance settings in response to the overall balance of risk from increasing travel in the context of higher vaccination coverage, and the results of the validation studies of saliva testing. Updates to the Surveillance Strategy ultimately provide the foundation for any mandatory saliva testing regime at the border.
 - **Further understanding of the use of saliva testing internationally** New South Wales have been using daily saliva testing for border workers for some time. The Ministry has reached out to its New South Wales counterparts to gain a greater understanding of their regime, to inform decisions around our own introduction of saliva testing at the border.
- c. **Ongoing validation of saliva as a sample** panels of saliva samples collected by ESR at JetPark have been provided to four laboratories in the network for analysis If the results for the analyses by the laboratories show close agreement this will contribute to greater confidence in the methods in use for a saliva-testing. The results of this verification work are expected during July.

17. This work and the learnings of the prototype will also inform future work exploring a mandatory testing regime using only saliva samples.

Next steps

- 18. The Ministry will begin to reflect this position in future work on saliva testing, and ensure it is well communicated across the health and disability sector. In addition:
 - a. the prototype which began on 28 June 2021 will run for a total of four weeks, following which an update will be provided on the findings
 - b. the Ministry will continue to engage with border agencies, PCBUs and workers to increase uptake in the prototype
 - a briefing and draft amendment order will be provided in the week beginning 19 c.

Appendix One – International literature on testing for COVID-19 using saliva as a sample

Several systematic reviews have been published comparing various samples for the detection of SARS-CoV-2 to diagnose COVID-19 (listed below.) Four have been summarised below.

Study	Number of included studies in meta- analysis	Pooled sensitivity of nasopharyngeal swabs	Pooled sensitivity of saliva	Comments
Butler-Laporte, G. (JAMA) [1]	16	84.8% (95% CI: 76.8%-92.4%)	83.2% (95% Cl: 77.4-91.4%)	 Adjusted pooled estimates for nasopharyngeal swabs being an imperfect reference standard
Moreira, V.M. (Diagnostics)[2]	16	Not provided	83.9% (95% Cl: 77.4-88.8%)	 Diagnostic accuracy of saliva estimated to be 92.1% (95% CI: 70.0-98.3) Mean difference of cycle threshold (CT) for saliva compared to NP was 2.792 (95% CI: -1.457; 7.041). On average, CT was higher in saliva indicating lower viral loads were observed in saliva versus nasopharyngeal swabs.
Tsang, N. (Lancet Infectious Disease) [3]	14	Not provided	85% (95% CI: 75-93%)	 Pooled specificity: 99% (95% CI: 98-99%) Pooled positive predictive value (PPV): 93% (95% CI: 88-97%) Pooled negative predictive value (NPV): 97% (95% CI: 94-98%)
Atieh, M. O. (Oral Diseases) [4]	16	Not provided	0.88% (95% Cl 0.82–0.92%)	 Random effects meta-analytic model

References

- 1. Butler-Laporte, G., et al., Comparison of Saliva and Nasopharyngeal Swab Nucleic Acid Amplification Testing for Detection of SARS-CoV-2: A Systematic Review and Meta-analysis. JAMA Internal Medicine, 2021. **181**(3): p. 353-360 DOI:10.1001/jamainternmed.2020.8876.
- Moreira, V.M., et al., Diagnosis of SARS-Cov-2 Infection by RT-PCR Using Specimens Other Than Naso- and Oropharyngeal Swabs: A Systematic Review and Meta-Analysis. Diagnostics, 2021. 11(2) DOI:10.3390/diagnostics11020363.
- 3. Tsang, N.N.Y., et al., *Diagnostic performance of different sampling approaches for SARS-CoV-2 RT-PCR testing: a systematic review and meta-analysis.* The Lancet Infectious Diseases, 2021 DOI:https://doi.org/10.1016/S1473-3099(21)00146-8.
- Atieh, M.A., et al., The diagnostic accuracy of saliva testing for SARS-CoV-2: A systematic review and meta-analysis. Oral Diseases, 2021. n/a(n/a) DOI:https://doi.org/10.1111/odi.13934.

Other reviews

Kivelä, J.M., et al., Saliva-based testing for diagnosis of SARS-CoV-2 infection: A meta-analysis. Journal of Medical Virology, 2021. 93(3): p. 1256-1258.

Lee, R.A., et al., *Performance of Saliva, Oropharyngeal Swabs, and Nasal Swabs for SARS-CoV-2 Molecular Detection: A Systematic Review and Meta-analysis.* Journal of Clinical Microbiology, 2021: p. JCM.02881-20.

Mohammadi, A., et al., SARS-CoV-2 detection in different respiratory sites: A systematic review and meta-analysis. EBioMedicine, 2020. 59.

Khiabani, K. and M.H. Amirzade-Iranaq, Are saliva and deep throat sputum as reliable as common respiratory specimens for SARS-CoV-2 detection? A systematic review and meta-analysis. American journal of infection control, 2021: p. S0196-6553(21)00140-1.

.yn Yokota, I., et al., Equivalent SARS-CoV-2 viral loads by PCR between nasopharyngeal swab and saliva in symptomatic patients. Scientific Reports, 2021. 11(1): p. 4500.



Memorandum

Testing for COVID-19 using saliva as a sample – rollout plan

Date due to MO:	13 July 2021	Action required by:	N/A
Security level:	IN CONFIDENCE	Health Report number:	20211606
То:	Hon Chris Hipkins, Mi	nister for COVID-19 Response	190
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Contact for te	lephone discussio	n Rhh	

Contact for telephone discussion

Name	Position	Telephone
Shona Meyrick	Deputy Chief Executive (acting) – COVID- 19 Health System Response	s 9(2)(a)
Darryl Carpenter	Group Manager – Testing and Supply	s 9(2)(a)
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Action for Private Secretaries RELEASEDUNI

N/A

Date dispatched to MO:

Testing for COVID-19 using saliva as a sample – rollout plan

Purpose

The purpose of this memo is to provide information on the plan for rolling out testing 1. for COVID-19 using saliva as a sample to border workers.

Key dates

- The full draft rollout plan is appended to this memo; however, this will continue to be 2. updated regularly as work progresses. Several key milestones and activities are outlined below:
 - a. Week beginning 12 July 2021 – during this week, the draft amendment to the Order and associated Health Report will be prepared, and workshops will be held with agencies and sectors to support detailed preparation work. In addition, the prototype will be expanded across the Canterbury region.
 - b. Week beginning 19 July 2021 consultation will be carried on the draft amendment to the Order, and engagement will continue to support preparations for the rollout.
 - c. Week beginning 26 July 2021 the Order amendment finalised and gazetted and a report back will be prepared on the learnings of the prototype. An invitation to port workers to participate in saliva testing will be sent.
 - d. Week beginning 2 August 2021 saliva testing will be operationalised for port workers and an invite to participate sent to all managed isolation and quarantine facility (MIQF) and aviation sector workers.
 - Week beginning 9 August 2021 saliva testing will be operationalised for MIQF e. and aviation sector workers, following which all border workers will have been invited to opt into testing for COVID-19 using saliva as a sample.
- Note that MIQF are currently under pressure as a result of high numbers of returnees from New South Wales, which may impact on this timeline. We will work with the Ministry of Business Innovation and Employment to ensure the rollout does not impact on their operations and update the plan if required.



Next steps

4. A further update on the roll out plan will be provided by 28 July 2021. Officials can provide further information about this topic at your request.

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RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982 Shona Meyrick Deputy Chief Executive (acting) **COVID-19 Health System Response** Date: 13/7/21

Appendix One – Draft Rollout Plan

	5 – 11 Jul	12 - 18 Jul	19 – 25 Jul	26 – 1 Aug	2 –8 Aug	9 – 15 Aug
Key milestones	 Sign off by DG on proposals for saliva testing Minister noted saliva testing position 	 Draft Order amendment and health report Monitoring plan in place and success measures Finalised Communications and Engagement plan Draft national rollout plan in place 	 Consultation on draft Order amendment 	 Order amendment finalised and gazetted (30 July 2021) Update national rollout plan Retrospective of prototype (4- weeks since go-live) 	ACT 1982	All workers invited to opt into saliva testing
Key engagement	 Sector group meetings i.e. Maritime NZ Union & Maritime NZ Pilot Engagement Comms leads meetings Governance + Saliva Operational delivery group meeting Finalise engagement plan MOH/APHG/AIRNZ meetings Consolidation of all communications for saliva testing 	 Ongoing sector and agency engagement Survey border workers Sector update Workshops with agencies Aviation Maritime meeting MIQ workshop Saliva Testing Operational Delivery Group (STOG) workshop series Second workforce survey questionnaire for MOH and MBIE Engagement with Maritime Sector (roadshow) 	 Ongoing sector and agency engagement Engagement with DHBs Engagement with Health Leads Engagement with Maritime Sector (roadshow) 	Ongoing sector and agency engagement	 Ongoing sector and agency engagement 	Ongoing sector and agency engagement
Prototype	 Monitoring and outreach team in place for support and compliance Ongoing engagement and alignment in approach with APHG Prototype continues in Canterbury 	 Collateral approved and ready for distribution Ongoing engagement and alignment in approach with APHG Expansion across Canterbury 	 Ongoing engagement and alignment in approach with APHG Ongoing review of prototype and progress 	 Report back to BTGG on prototype Ongoing engagement and alignment in approach with APHG Retrospective of prototype following 4-week cycle Prototype begins transition to national rollout 		
Phased rollout		Preparations with maritime and aviation sectors and MIQF workers	Preparations continue with maritime and aviation sectors and MIQF workers	 Invitation to rollout to all ports Preparations continue with aviation sector and MIQF workers 	 Rollout to all ports operationalised Invitation to rollout to aviation sector and MIQF workers 	 Rollout to aviation and MIQF workers operationalised
Foundations for national rollout for border workers	 IT requirements for national rollout identified MBIE scoping roll out plan for MIQFs Compliance workshop Review onboarding collateral packs Confirming APHG readiness Ongoing planning and alignment with APHG 	 IT automation completed New privacy statement in place Finalise transition plan for national rollout Ongoing planning and alignment with APHG 	 Compliance changes to BWTR in place Ongoing planning and alignment with APHG Early review of lessons learned and findings from prototype for final preparations for national rollout 	 Ongoing planning and alignment with APHG 	 Collateral distributed IT changes implemented Application of prototype learnings 	



Memorandum

Saliva Testing Update

Date due to MO:	30 July 2021	Action required by:	N/A
Security level:	IN CONFIDENCE	Health Report number:	NA of
То:	Dawn Kelly, Private Secr System Response	etary – Office of the Minister	for COVID-19 Health
			014
Contact for te	lephone discussion	RMA	

Contact for telephone discussion

Name	Position	Telephone
Darryl Carpenter	Group Manager – Testing Supply	s 9(2)(a)

Action for Private Secretaries

For noting RELEASEDUNDE



Saliva Testing Update

Context

- 1. The Ministry of Health has recently updated its position on saliva testing, based on international literature, validation work by local laboratories, and the position of the New Zealand Microbiology network.
- 2. The Ministry is now confident that there are surveillance situations where testing for COVID-19 may be carried out using saliva samples instead of nasopharyngeal swabs, including where frequent testing of border workers can potentially identify cases earlier, before chains of transmission are generated.
- 3. This updated position is reflected in the roll out of saliva testing for border workers, who will now be able to undertake a series of saliva tests rather than regular nasopharyngeal swabbing.

Current Status – where we are at now

- 4. We have established a cross-agency working group to support the successful implementation of saliva testing across Aviation, Ports and MIQFs. This group has worked together to develop a compliance approach, operational processes, engagement and roll out plan across the sectors.
- 5. Work is now underway to implement the rollout plan including:
 - Engagement with DHBs, workers and PCBUs is now underway:
 - The team is doing a roadshow alongside the Vaccination Team (where possible), to promote saliva testing to workers as well as meeting with PCBUs and DHB Leads, including Medical Officers of Health, to update them on saliva testing. Meetings have been held in Auckland, Wellington, Christchurch and Nelson this week with further meetings with ports across the country planned in the next two weeks.
 - The Ministry has also been working with MBIE and together have agreed to a phased rollout approach with all workers on a 7-day cycle being offered saliva testing from mid-August. These are the workers at JetPark in Auckland and discussions are already underway for mobilisation.
 - Mobilisation our service provider, APHG, has started having site meetings to finalise arrangements for the location of drop-off and collection booths and other logistics arrangements. As part of the mobilisation phase, workers will be invited to participate in saliva testing as part of a phased rollout from mid-August. Collateral has been developed that will be provided to PCBUs to share with their workers. We have had positive feedback on this collateral in meetings we have held in Auckland this week.
 - Go live the RTO is on track to come into force on 11 August, with a phased implementation plan in place for rollout (high level implementation overview is attached).



Next steps

- 6. Ministerial consultation on the Required Testing Order is underway, and we are on track for the RTO to come into force on 11 August.
- 7. Continuing with meetings on mobilisation with PCBUs, DHBs and sites with follow-up mobilisation meetings with our service provider (APHG), with go live information for each site updated as discussions are completed.
- 8. Facilitate access to sites for APHG to progress mobilisation.
- d te 9. Continue with border worker testing survey to gauge current experience of testing and

Saliva Testing Update 30 July 2021

	12- 18 Jul	19 – 25 Jul	26 Jul – 1 Aug	2 – 8 Aug	9 – 15 Aug	16 – 22 Aug	23 – 29 Aug	Next
Key Milestones	Parliamentary Counsel Office issued drafting instructions (15 July 2021)	Agency consultation on draft Order amendment (23-26 July 2021) Discussions with all DHB Health Leads and DHB sector leads	Incorporate feedback on draft Order amendment (27-28 July 2021) and draft Health Report Ministerial consultation on draft Order amendment (29 July – 5 August 2021)	Final version of the Order amendment for signing (6-9 August 2021)	Order amendment gazetted and in force Groups 1-2 operationalised Group 5 – Jetpark and prototype site operationalised	Group 3 operationalised	Group 4 operationalised	Group 4 and 5 operationalised Review of saliva Testing (mid- September) with recommendations implemented from October 2021
Group 1 Expansion across Canterbury and Dunedin port (NPS still required until 11 Aug)		Mobilisation Duendin Port and expansion of Canterbury prototype	Operationalisation Dunedin Port Continue with mobilisation as required	Monitoring progress with implementation	Transition to BAU for saliva testing			
Group 2 All Auckland sites (airport, ports and Jetpark) Ports Phase A (to confirm) – Northport, Opua, Auckland, Tauranga		Initial discussion with Tauranga Port	APHG Mobilisation discussions in Aucklandand Northland APHG/ MOH/Northern Regional Health Coordination Centre (NRHCC) meeting for roll out across all sectors On-site discussions with Auckland PCBUs on request (Air NZ, Swissport, Aviation Security) Nelson Port, and Auckland Ports site visit	Mobilisation continues Invitation to participate Site visits to ports Opua, Northport Gisborne, Taranaki, Tauranga site visits	Saliva Testing operationalised and underway	Monitoring progress and implementation	Monitoring progress and implementation	Transition to BAU
Group 3 Ports Phase B			JNDE	Invitation to participate Site visits to ports for mobilisation	Site mobilisation (APHG)	Saliva Testing operationalised and underway	Monitoring progress and implementation	Monitoring progress and implementation
Group 4 Ports Phase C Any remaining sites including Canterbury		48	550	Invitation to Participate Site visits	Site visits continue to southern ports (MoH, APHG)	Mobilisation continues	Saliva Testing operationalised and underway	Monitoring progress and implementation
Group 5 MIQFs	Meeting with DHB Health Leads Workshop with MBIE on roll out schedule	Follow up workshop with MBIE on roll out schedule	Mobilisation meeting with Jetpark MBIE roll out Schedule finalised with Regional Ops leads	Invitation to participate Mobilisation (JetPark and Protoytpe site	Roll out Jetpark and Protoytpe site			Review of protoytpe (mid-Sep) Phased roll out across across MIQFs depending on work pressures (e.g. NSW returnees, Olympians, N95 masks)



Briefing

Update on the roll out of the option of saliva testing for COVID-19 to border workers

Date due to MO:	5 August 2021	Action required by:	N/A	
Security level:	IN CONFIDENCE	Health Report number:	20211764	
То:	Hon Chris Hipkins, Minister for COVID-19 Response		C Terrer	

Contact for telephone discussion

Name	Position	Telephone
Bridget White	Deputy Chief Executive – COVID-19 Health System Response	s 9(2)(a)
Darryl Carpenter	Group Manager – Testing and Supply	s 9(2)(a)

Minister's office to complete:

□ Approved

 \Box Decline

□ Needs change

□ Seen

□ See Minister's Notes

□ Withdrawn

□ Noted

□ Overtaken by events

Comment:

Update on the roll out of the option of saliva testing for COVID-19 to border workers

Security level:	IN CONFIDENCE	Date:	5 August 2021	
То:	Hon Chris Hipkins, Mir	nister for COV	ID-19 Response	

Purpose of report

1. The purpose of this paper is to provide an update on the roll out of saliva testing for COVID-19 to border workers subject to mandatory testing under the COVID-19 Public Health Response (Required Testing) Order 2020 (the Required Testing Order).

Summary

- 2. The Ministry of Health (the Ministry) has been assessing the role of testing for COVID-19 using saliva as a sample for some time. By April 2021, the Ministry was confident in using saliva as a sample that the recommendation was made to begin preparing to roll it out to relevant border workers as an additional testing option.
- 3. A saliva testing prototype was conducted in Canterbury. Persons conducting a business or undertaking (PCBUs) and workers at the time raised several issues with the proposed regime, that led to a low uptake. Many concerns related to the regime's requirement for workers to continue with some nasopharyngeal swab tests and the compatibility of the saliva testing frequency with complex shift patterns.
- 4. Since then, the Ministry has updated its position on saliva testing, based on international literature, validation work by local laboratories, and the position of the New Zealand Microbiology Network. The Ministry is now confident there are surveillance situations where testing for COVID-19 may be carried out using saliva samples instead of nasopharyngeal swabs. This includes the regular testing of border workers.
- 5. This updated position is now being acted on by introducing saliva testing, using a refined testing regime, as an option for border workers.
- 6. An implementation plan is in place with a phased rollout starting from 11 August 2021, when the amended Required Testing Order (RTO) is expected to come into force.
- 7. The rollout will be phased in such a way that it meets border site-specific requirements and demand, including ongoing high levels of managed isolation and quarantine facility (MIQF) occupancy.
- 8. There are several potential challenges to the successful rollout of saliva testing, including ongoing hesitancy to changing testing regimes, which are being proactively addressed.
- 9. The rollout of saliva testing will be reviewed in mid-September with recommendations for further changes including the testing cycle and to the Border Workforce Testing Register (BWTR), if appropriate.
- 10. Adaptations will be made as necessary, and, from October, saliva testing will become part of 'business as usual' for border worker surveillance testing.

Recommendations

We recommend you:

- **Note** the Ministry has acted on its updated position on saliva testing and **Yes**, No a) developing a revised saliva testing regime.
- b) Note the Ministry has balanced the public health, science, legal and policy views with feedback from agencies, PCBUs and border workers in finalising arrangements for saliva testing.
- Note the process of implementing saliva testing as an option for border Yes, No C) worker surveillance testing is well underway and that a phased rollout will commence from 11 August 2021 when a revised Required Testing Order is expected to come in to effect.
- Yes No d) Note a process for monitoring border worker compliance with saliva testing has been developed, utilising the Border Workforce Testing Register (BWTR).
- Note the Ministry will be monitoring the uptake of saliva testing and that a Yes No e) review of the rollout is planned to take place in September 2021.

Bridget White

Deputy Chief Executive COVID-19 Health System Response Date: 4

Hon Chris Hipkins **Minister for COVID-19 Response** Date: 19/8/2021





Yes No





Update on the roll out of the option of saliva testing for COVID-19 to border workers

Background

- 11. The Ministry has been assessing saliva as a sample for testing for COVID-19 for some time as part of its COVID-19 surveillance strategy. Previously, evidence had shown that saliva testing was not as sensitive as nasopharyngeal swabs, meaning there was the potential for missed infections. A single missed infection could have a significant effect in New Zealand, where there is a very low prevalence of COVID-19, and potentially lead to widespread community outbreaks.
- 12. By April 2021, the Ministry had become confident enough in saliva as a sampling method that the recommendation was made to roll it out to border workers at a higher frequency, albeit with a regular nasopharyngeal swab to mitigate any associated risks with a lower sensitivity test.
- 13. A prototype has been underway in Canterbury since 28 June 2021. In delivering the prototype, PCBUs and workers raised several issues with the testing regime, that ultimately led to low uptake. The concerns included concerns about lowering the efficacy of testing and hence increasing risk and that complex and irregular shift patterns made compliance with a higher frequency testing regime difficult for border workers. There was also a perception by workers that there would be a direct one for one swap of nasopharyngeal swabs for saliva tests and expressed unwillingness to provide samples outside of work hours.
- 14. Since then, the Ministry has continued to review emerging science and validation studies by New Zealand and overseas laboratories. These have provided further confidence in saliva as a sampling method.

The Ministry's updated position on saliva testing

- 15. In April 2021, as a result of new evidence and information and the advice of the Ministry's Saliva Testing Clinical Governance Group, the Ministry revised its position on saliva testing having become confident that there are surveillance situations where testing for COVID-19 may be carried out using saliva samples instead of nasopharyngeal swabs. These include where frequent testing of border workers has the potential to identify cases earlier and before chains of transmission are generated.
- 16. It was also identified that saliva testing would support the need for increased frequency of testing of the border workforce as they become vaccinated. There is compelling evidence that as vaccinated individuals are less likely to be symptomatic if infected, and therefore less likely to seek a test outside of the regular testing regime, the frequency of surveillance should be increased.
- 17. This updated position has enabled changes to be made to the saliva testing regime in preparation for national rollout. This includes removing the need for a nasopharyngeal swab and simplifying the testing regime. This updated position has also facilitated engagement with agencies and PCBUs to refine the testing process and overcome many of the issues raised by PCBUs and workers during the Canterbury prototype. It is

anticipated that these changes will significantly increase uptake in this testing option. Current estimates are that 25% of border workers may opt into saliva testing, but the ongoing survey of workers will provide more information on this.

Implementation of saliva testing for border worker surveillance testing

- 18. The Ministry has established a cross-agency working group to support the successful implementation of saliva testing for all relevant border workers, across the air and maritime borders and MIQFs. It has also engaged with DHB Health Leads and DHB Testing Leads across all three sectors.
- 19. The implementation programme includes five key stages; pre-planning, engagement, mobilisation, a phased rollout and monitoring and transition to 'business as usual'.
- 20. Pre-planning has been completed and the engagement and mobilisation phases are well underway. A phased rollout of saliva testing will begin on 11 August 2021.

Engagement

- 21. The Ministry has been carrying out a 'roadshow' (in tandem with the Ministry's Vaccination Team where possible) to promote saliva testing to workers. Communications collateral has been developed for PCBUs to share with their workers. This is also being used as an opportunity to meet PCBUs and DHB Leads, including Medical Officers of Health, to update them on saliva testing.
- 22. Meetings have so far been held in Auckland, Wellington, Gisborne, Christchurch, Taranaki and Nelson. A schedule of ongoing engagement in order to prepare specific sites, regions and sectors is in place.

Mobilisation

- 23. The mobilisation phase ensures that the necessary infrastructure is in place.
- 24. The saliva testing service provider, Asia Pacific Healthcare Group (APHG), is conducting site meetings to finalise arrangements for the location of drop-off and collection booths, saliva kit restocking arrangements, confirming courier schedules and other logistical arrangements.

Phased Rollout

- 25. All workers on a 7-day testing cycle are, as a priority, being invited in the week commencing 2 August to opt into saliva testing. There will be a transition period as workers who opt-in to saliva testing undertake the final nasopharyngeal test in their current cycle.
- 26. Workers on a 14-day testing cycle are also being invited to opt into saliva testing. Compliance monitoring for regular testing has shown that maritime border workers, most of whom are on a 14-day testing cycle, are most likely to be non-complaint. This group of workers, however, also showed strong support for saliva testing in the preplanning phase. Accordingly, it was decided to include these workers in an early phase of the rollout of saliva testing.
- 27. The Ministry has been working with the Ministry of Business, Innovation and Employment (MBIE) to deliver a phased rollout for MIQF workers. The phasing of the rollout to MIQF workers will help enable uptake given the other change activity taking

place at MIQFs such as returnees from Australia, Olympians returning from Tokyo, and the move to the use of P2 / N95 particulate respirators by non-healthcare workers.

- 28. To begin with, testing will be conducted involving MIQF workers at the Jet Park facility in Auckland, all of whom are currently on a 7-day testing cycle and are already familiar with saliva testing, albeit on a voluntary basis.
- 29. To ensure the participation of the healthcare workforce who test border workers and are therefore subject to required testing, meetings have been held with each of the DHBs' health leads and DHB leads for Auckland and Christchurch International Airport and for each of the ports. Some DHBs have agreed that they will just be treated as PCBUs, while others are actively involved in leading the rollout. The Northern Region Health Coordination Centre is supporting the rollout across the Auckland region.

Updated border work saliva testing regime and monitoring compliance

Amending the Required Testing Order (RTO)

30. To enable border worker surveillance testing to be done using saliva testing alone, without any a nasopharyngeal testing, a change to the RTO is necessary. Ministerial consultation on a draft Amendment Order for the RTO has been completed. A final Amendment Order will be provided to you on 6 August for your signature by 9 August to enable the Amendment Order to come into force on 11 August.

Saliva testing regime

- 31. The updated saliva testing regime will apply to all workers subject to mandatory COVID-19 testing the under the RTO who opt into saliva testing. It will see them conduct a series of a tests within a seven-day period. Each series will include a minimum of two tests at least two days apart, but workers can choose to test more than twice if it works for them and provides them additional reassurance. Any positive saliva test result will need to be confirmed via a nasopharyngeal swab.
- 32. In addition, the saliva testing guidance will encourage border workers who are going on an extended period of leave (more than seven days) to undertake another saliva test three days after their final working day, or alternatively to have a nasopharyngeal test. The testing regime will be under review throughout the phased rollout and in the review of saliva testing to take place in mid-September and further changes to the RTO will be considered thereafter.

Monitoring compliance

- 33. As part of the engagement phase, we have been working with PCBUs and workers to facilitate their understanding of and participation in the saliva testing regime and the compliance process.
- 34. Discussions during the engagement phase have indicated that border workers see saliva testing as simple and this suggests compliance with be at least maintained. Testing compliance is already high in some sectors, particularly amongst MIQF workers. It is anticipated that saliva testing will help assist compliance for maritime border workers and others who work night shifts when nasopharyngeal testing centres are closed as saliva testing is self-administered.
- 35. The saliva testing process includes the worker scanning a barcode on their sample tube when they deposit a sample, using the dedicated COVID-19 saliva testing 'app' provided

by APHG. This will allow the BWTR to receive almost real-time information on when workers fulfil their testing requirements, facilitating the compliance monitoring process. The app will also be used to provide test result notifications to workers. A manual process is available for those without access to the app.

- 36. Monitoring border worker compliance with the saliva testing regime will be performed in the same way that it is currently for nasopharyngeal testing, utilising the BWTR and the Monitoring and Outreach team at the Ministry and the Workforce Team at MBIE. Non-compliance will be addressed firstly by education of the relevant PCBU and worker, followed where necessary by escalation to a directive letter. If required, an infringement notice will be issued.
- 37. The BWTR can differentiate between border workers undertaking saliva testing and those continuing to undergo nasopharyngeal testing. Levels of compliance with each will be reported on separately.

Key dates

38. A summary of the phased rollout of saliva testing sites, regions and sectors is provided in the table below:

Date	Where / Who		
Week of 2 Aug	Ongoing engagement and preparation for rollout		
Week of 9 Aug	 Auckland Airport Jet Park MIQF Northport Port of Opua Ports of Auckland Chelsea Port Devonport (RNZ Naval Base) Kauri Point, Birkenhead (RNZ Naval Base) Viaduct Marina Silo Marina Westhaven Marina Port of Tauranga Lyttleton Port 		
Week of 16 Aug	 Gisborne (Eastland Port) Taranaki (Port of Taranaki) Nelson (Port Nelson and Marlborough Port) Wellington (Centre Port) Timaru (Prime Port) Dunedin (Port Otago) 		
Week of 23 Aug	 Remaining ports Canterbury airport MIQFs in Wellington, Rotorua and Hamilton 		
Week of 6 Sep	Phased rollout for remaining MIQFs		

Potential challenges to saliva testing

- 39. There are several potential challenges to successfully introducing saliva testing as an option for border workers.
- 40. Level of uptake This has been a key focus in the development of the saliva testing programme and the engagement campaign has been designed to promote uptake to all border workers.
- 41. Nationwide access APHG are confident that saliva testing will be available to all border workers through the phased rollout.
- 42. Confidence in saliva testing The programme of engagement has included the provision of information and reassurance about the science supporting saliva testing and what would be required if a saliva test is positive (the need for the worker to undertake nasopharyngeal test). The phased rollout will allow workers to take up saliva testing when they are ready.
- 43. Complex shift patterns This is being addressed during the Ministry's 'roadshow' and via the communication collateral being distributed. This is an iterative process and collateral will continue to be developed over time as feedback is received.
- 44. 'Change fatigue' Along with the introduction of saliva testing, the rollout of the vaccination programme is ongoing and changes to mandatory vaccination requirements for certain border workers are imminent. Additionally, changes are also being made to the respiratory masks worn by workers in MIQFs. The phasing of the rollout has been planned to work with these other priorities.
- 45. PCBU Data quality This is already managed by the compliance team for nasopharyngeal testing and is mitigated by monitoring information provided by, and regularly communicating with, PCBUs.
- 46. Compliance Some PCBUs have expressed concerns about a drop in testing compliance, at least initially as workers get used to saliva testing. This will be managed through active monitoring, including separate reporting on saliva testing compliance, and proactive follow-up over non-compliant workers.

Next steps

- 47. Saliva testing will be operationalised first at Auckland International Airport, Jet Park Auckland, Christchurch International Airport and the Ports of Auckland. For these sites, from 11 August 2021 border workers will be able to start opting into saliva testing. The phased rollout of saliva testing for border workers at all other sites will continue thereafter.
- 48. Throughout the phased rollout of saliva testing the Ministry will monitor the level of uptake by border workers and supporting any workers who wish to opt in.
- 49. A review of the saliva testing rollout will be conducted in mid-September 2021. It will likely look at what has been learned about the reliability, practicality, uptake of and sustainability of saliva testing as part of the COVID-19 surveillance of the border workforce. The review will include consideration of the scientific, public health, PCBU and worker perspectives. Plans for this review will be developed during the rollout, and timeframes will be adjusted if the rollout requires this.

- 50. Following this review, consideration will be given to further refining the saliva testing regime. As a result, further changes may need to be made to the RTO.
- 51. This will also be an opportunity to consider whether there are other opportunities to utilise saliva testing in other situations, such as for community testing or testing international arrivals.
- 52. The Ministry will report on the findings of this review in early October 2021.

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