PRODUCT TESTING | UPDATE

OVERVIEW, PROCESS & RESOURCES

SPRING, 2022

NSLC PRODUCT TESTING | OVERVIEW

Objective: To ensure Nova Scotians are buying safe and quality products, adhering to federal regulations

Goal: NSLC partnership with ALAB to develop a product testing program and execute product tests

Strategy: In FY22 the NSLC commenced the phased implementation of a product testing program

Tactics: All product listed by the NSLC (domestic and imported) will be subject to product testing requirements

Product:

- New and existing NSLC listings part of testing program

Farmgate:

- Will be assessed in future
- Not in immediate scope

Costs:

- NSLC currently paying for cost of tests that are executed by ALAB

Phasing:

- Rotational sample approach
- Lab capacity
- Budget considerations

Existing Cert:

- Certificates of Analysis from accredited labs will be accepted
- Suppliers may submit existing certificates

Timeline:

- Full integration into NSLC listing process to be effective for FY24 product listings

ABOUT ALAB

ALAB BACKGROUND

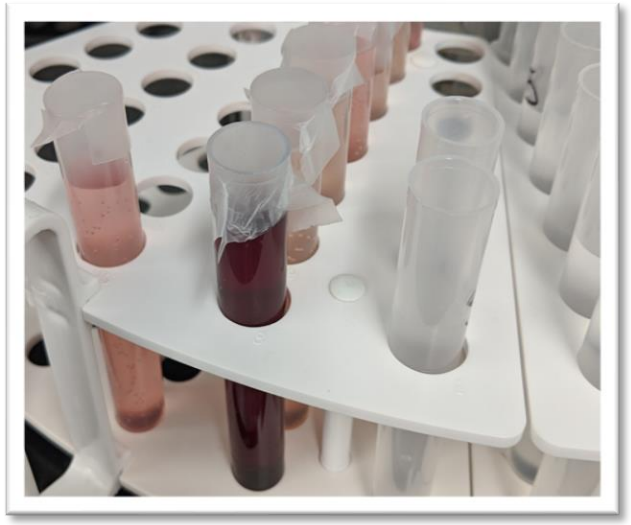
- Acadia Laboratory for Agri-food and Beverage
- Analytical tests for food & beverage sector
- ALAB formally established in 2017
- Full-time technician hired in 2018
- Housed on campus in the David Huestis Innovation Pavilion
  - 815 sq.ft. state-of-the-art lab
  - 2 offices / meeting space
  - Access to other labs, infrastructure and partners

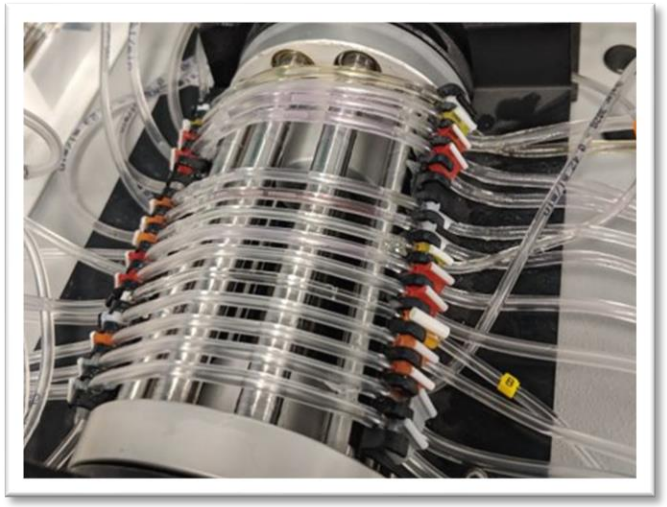
ALAB Video

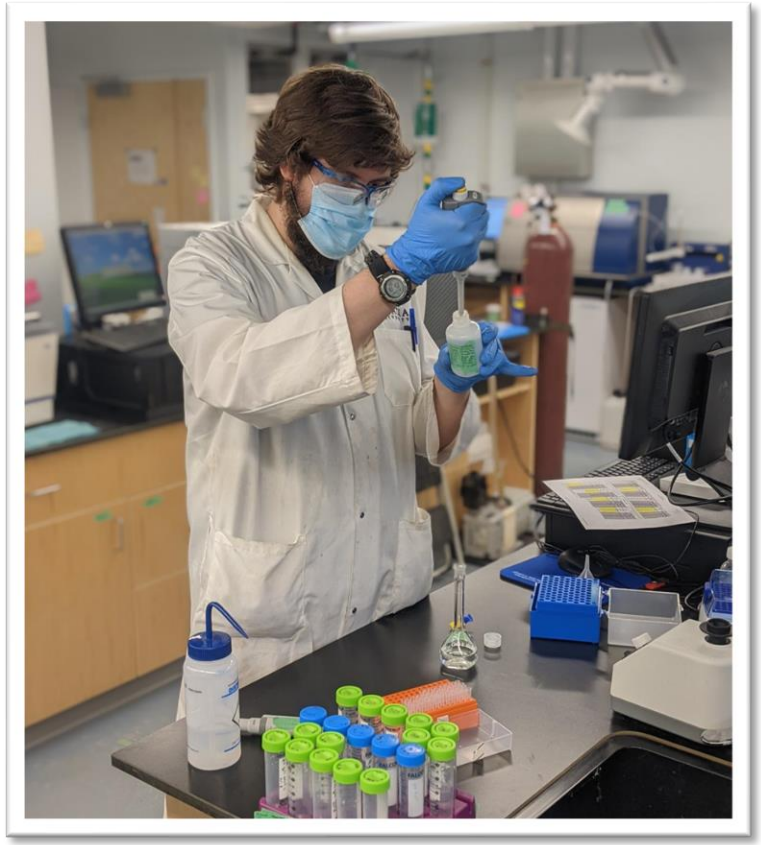
ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

ALAB'S QUALITY ASSURANCE

- ISO/ICE 17025 Accreditation received in February 2022
- Dedicated full time staff
- Fast response times
- Participation in monitored proficiency testing (ISO requirement)
- Intra-laboratory comparison testing (LCBO)







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ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

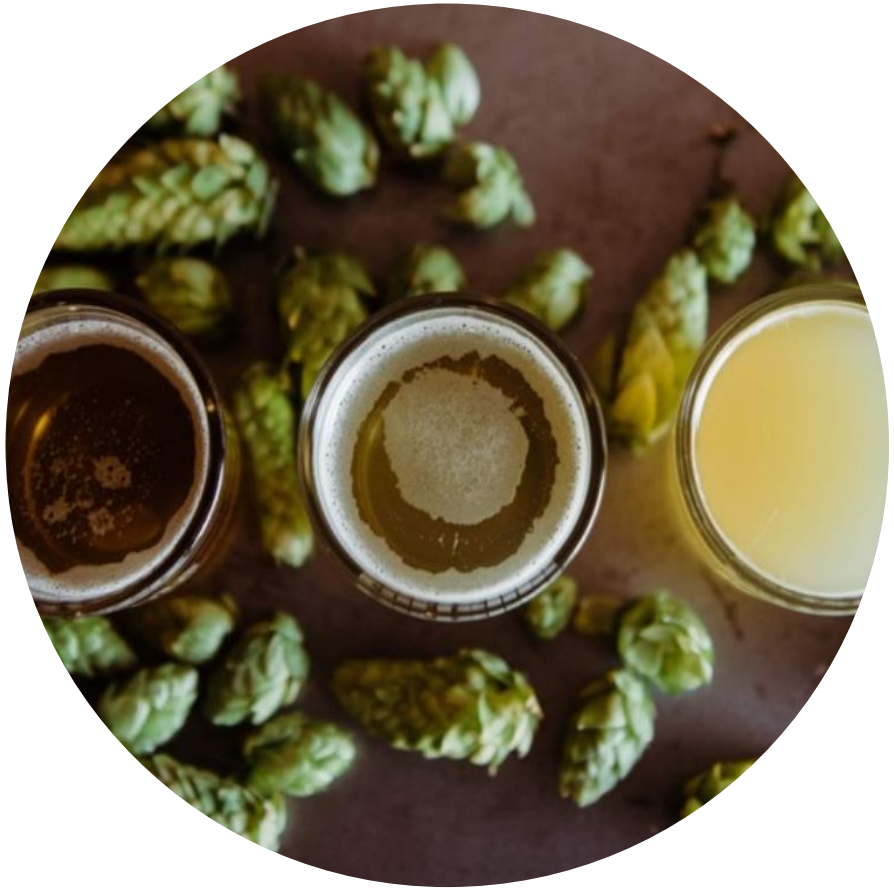
ALAB'S SERVICES

Product testing for all beverage alcohol products of raw and finished products

- Helps to ensure that your product is stable and protected
- Helps to ensure that your product is free of contaminants that are regulated by Health Canada
- Provides information for consumer interest (calories & carbohydrates, caffeine levels)
- Raw product analysis: Must, Grapes and Hops

Alcohol by Volume (ABV) - $25/test

- Supports your production process with quick and inexpensive ABV analysis
- Ensures your accurate product labelling
- Usually same day turn around (except cream liqueurs)



ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

ALAB'S SERVICES

Information on the following services can be found on ALAB's website https://alab.acadiau.ca/home.html

- List of all available analyses
- Sample submission forms with detailed instructions:
- Package deals for analyses are available
- We can work with you to develop new methods of analysis upon consultation

ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

ABOUT PERENNIA

PERENNIA BACKGROUND

- Perennia offers specialized development and consulting services to the agricultural, seafood, cannabis, and food and beverage processing sectors in Atlantic Canada.
- Our highly skilled and collaborative team focuses on superior customer service, proactive solutions and innovative approaches to meet client needs.
- Our mission is to support growth, transformation and economic development in Nova Scotia's agriculture, seafood, cannabis and food and beverage sectors.

(559) Perennia Video - YouTube

SERVICES OFFERED BY PERENNIA

Quality and Food Safety

- Gap assessments and audit preparation
  - Identifying potential gaps in written programs
  - Correcting identified non-compliances
- Food safety program development and coaching
  - Regulatory
  - Third-party certifications
- Recall and traceability guidance
  - Traceability program development (one step back, one step forward)
  - Recall program development and implementation
- Training
  - Custom in-house training
  - Public
  - Virtual / e-Learning

SERVICES OFFERED BY PERENNIA

Product Development

- Formula development
  - Prototype development
  - Review existing formulations for food safety and scale up
- Ingredient sourcing
- Packaging options
- Process development
  - Develop processes that can be scaled up
  - Review existing processes for troubleshooting
- Scale up assistance
- Nutrition Facts table development and label guidance
- Shelf-life studies

Mobile Services

- Mobile Bottling Service
- Crossflow Filtration

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SERVICES OFFERED BY PERENNIA

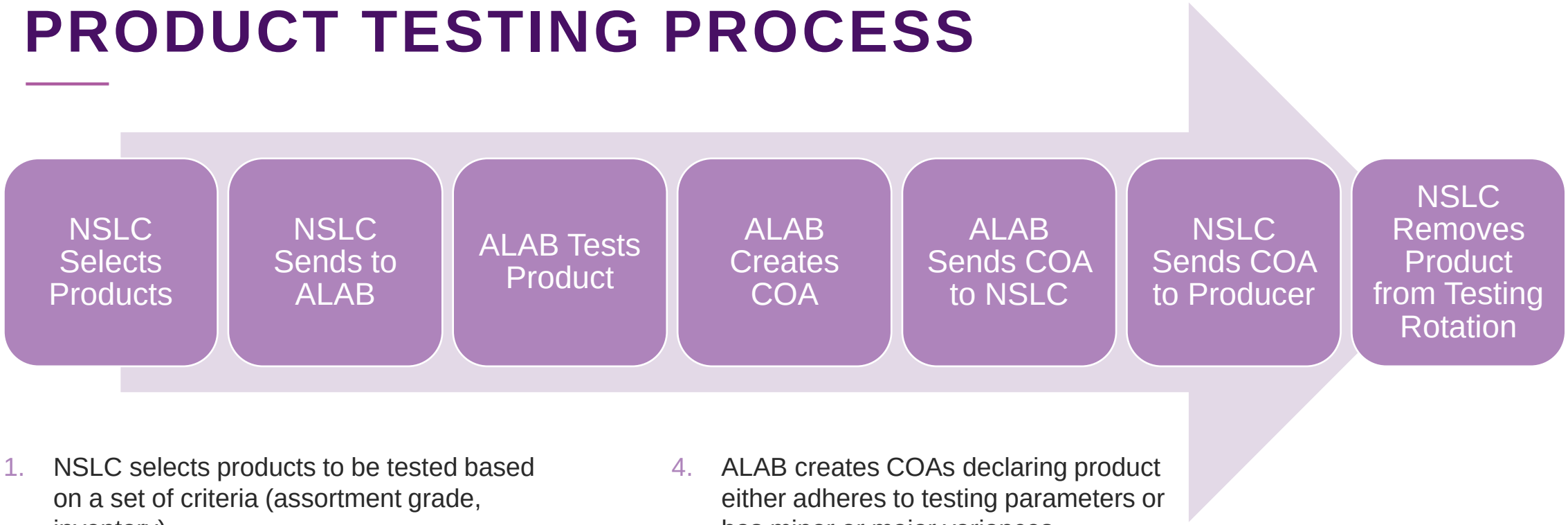
Winemaking Services

Main goal: Increase wine quality and meet current and emerging market demands

- Enological winery review
  - Overall examination of enological practices applied in the winery
- Sparkling winemaking assistance
  - Finding the most suitable sparkling winemaking method
  - Analysis of the current method to overcome any obstacle or to change the style
- Troubleshooting for winemaking
  - Defining the problem, solutions to overcome the problem and prevention
  - Bench trials for recommended products
- Blending assistance
  - Organoleptic evaluation of the wines and creation of the possible blend recipes
- Virtual consultation
  - Phone/online call consultations for wineries outside of Nova Scotia

PRODUCT TESTING PROCESS

PRODUCT TESTING PROCESS



1. NSLC selects products to be tested based on a set of criteria (assortment grade, inventory)
2. Selected products are shipped from NSLC DC to ALAB by end of week
3. ALAB tests products the following week and records results
4. ALAB creates COAs declaring product either adheres to testing parameters or has minor or major variances
5. ALAB sends COA to NSLC
6. NSLC sends COA to producer and advises on next steps if variance is identified
7. Product removed from testing rotation

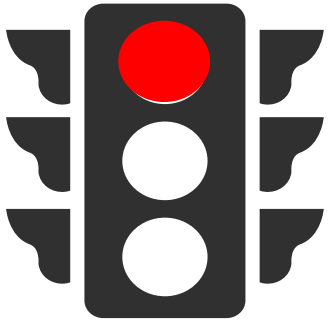
NSLC PRODUCT TESTING | VARIANCE ACTION

Level 1 – No Variance (Green Light)

- There are no issues with the product and the COA will be shared with the producer via e-mail
- Action: NSLC shares COA with supplier

Level 2 – Minor Variance (Yellow Light)

- There are variance levels that may trigger a conversation with the supplier, and in extreme cases de-listing due to flavour profile
- Action: NSLC to review the procedures, triage and take appropriate next steps with supplier

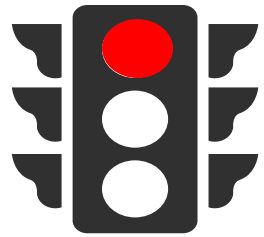


Level 3 – Major Variance (Red Light)

- There are variance levels over Health Canada limits that require a conversation with supplier and notification to Canadian Food Inspection Agency
- No Health Canada limits exist for ABV so an ABV Major Variance has been established by the NSLC for customer safety
- Action: NSLC to review procedures and take appropriate next steps with supplier and/or CFIA

There are support documents to assist the NSLC and suppliers in navigating different variance scenarios and determining what action should be taken

MAJOR VARIANCE PROCESS



Level 3 – Major Variance
(Red Light)

1. ALAB Identifies Major Variance

ALAB tests product

ALAB identifies major variance

ALAB communicates to NSLC

2. NSLC Gathers Internal Information

NSLC reviews major variance information

Determine current inventory

Internal or external capacity to relabel (ABV)

Cost to relabel (ABV)

3. NSLC Communicates with Supplier

NSLC and supplier plan to relabel / destroy product (ABV)

NSLC notify CFIA of major variance (Non ABV)

NSLC may decide to recall product as a precaution before CFIA determines next steps (Non ABV)

4. Action on Major Variance

Complete relabel or destruction of product (ABV)

CFIA to work with supplier to identify risk level with Health Canada (Non ABV)

5. Resolution

Supplier to notify NSLC of outcome with CFIA (Non ABV)

NSLC to close file once resolved

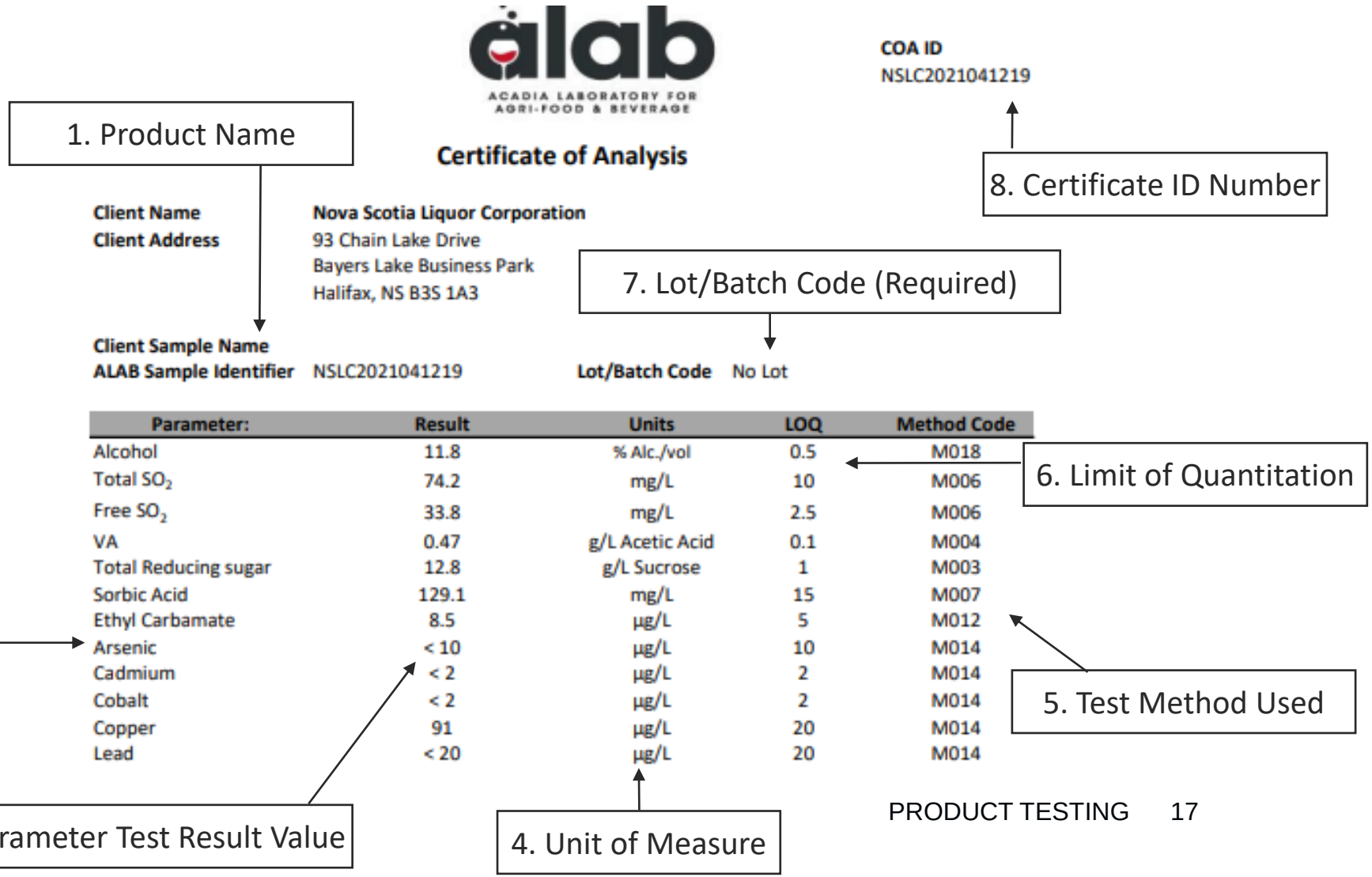
CERTIFICATE OF ANALYSIS

HOW TO READ

ALAB CERTIFICATE OF ANALYSIS (COA)

What is a certificate of analysis (COA)?

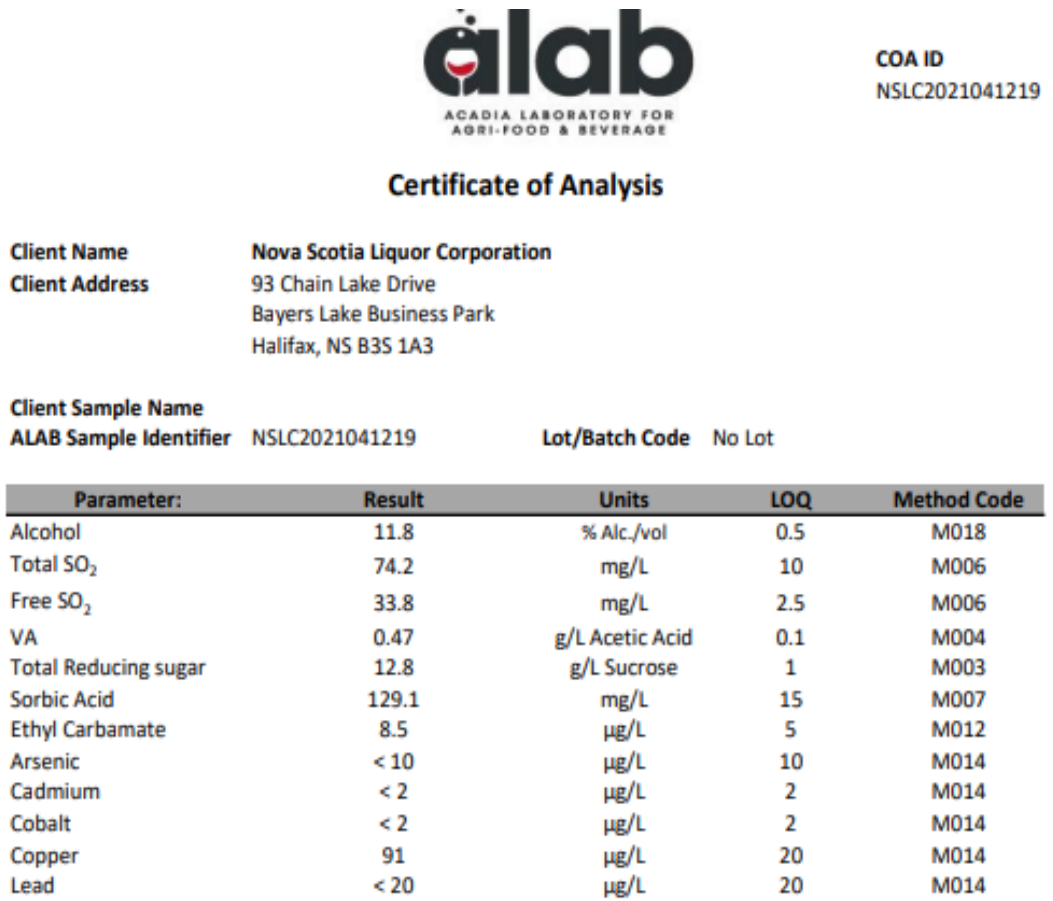
- A COA is a document certifying that a product has undergone specific testing with detailed results
- Document to record product specifications for consistent results



CERTIFICATE OF ANALYSIS (COA)

Where can COAs be found?

- After each product is tested, COAs will be emailed directly to the supplier, and will be stored in our internal database
- Results will be recorded via NSLC's internal product testing dashboard
- Individualized overview of your results will be available upon request



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ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

COA ID
NSLC2021041219

Certificate of Analysis

Client Name **Nova Scotia Liquor Corporation**
Client Address 93 Chain Lake Drive
Bayers Lake Business Park
Halifax, NS B3S 1A3

Client Sample Name
ALAB Sample Identifier NSLC2021041219 **Lot/Batch Code** No Lot

Parameter:	Result	Units	LOQ	Method Code
Alcohol	11.8	% Alc./vol	0.5	M018
Total SO_2	74.2	mg/L	10	M006
Free SO_2	33.8	mg/L	2.5	M006
VA	0.47	g/L Acetic Acid	0.1	M004
Total Reducing sugar	12.8	g/L Sucrose	1	M003
Sorbic Acid	129.1	mg/L	15	M007
Ethyl Carbamate	8.5	µg/L	5	M012
Arsenic	< 10	µg/L	10	M014
Cadmium	< 2	µg/L	2	M014
Cobalt	< 2	µg/L	2	M014
Copper	91	µg/L	20	M014
Lead	< 20	µg/L	20	M014

PRODUCT TESTING RESOURCES

NSLC STANDARD ANALYSIS PARAMETERS | ALCOHOL BY VOLUME

What is alcohol by volume (ABV)?

- A standard measure of the alcohol content in alcoholic beverages
- Food and Drug Regulations require all alcoholic beverages containing 1.1% or more ABV to declare the percentage by volume of alcohol contained in the product on the label

Why is ABV tested?

- To ensure that the ABV declared on the label is what the product contains

What are the factors influencing ABV?

- Ingredients and formula
- Process controls
- Environment

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NSLC STANDARD ANALYSIS PARAMETERS | METHANOL

What is methanol?

- Chemical naturally formed during fermentation when pectin in fruits is broken down
- Used in many different industrial applications

Why is methanol tested?

- Exposure to high concentrations of methanol can result in methanol poisoning and cause short- and long-term health effects such as damage to or death of the optic nerve

What are the factors influencing methanol levels?

- Raw materials
- During processing (e.g., pH and temperature at different process steps, distillation method)
- Economically motivated adulteration

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NSLC STANDARD ANALYSIS PARAMETERS | HEAVY METALS

What are heavy metals?

- Naturally occurring elements found throughout the earth's crust
- Human activities have caused them to become distributed throughout the air, water, and soil
- Arsenic, Cadmium, Cobalt, Copper, Lead

Why are they tested?

- Most are classified as carcinogenic or possibly carcinogenic agents by the International Agency for Research on Cancer

What are the sources of heavy metals?

- Raw materials (e.g., fruits, vegetables, grains, additives, water)
- During processing (e.g., water, equipment)

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NSLC STANDARD ANALYSIS PARAMETERS | PESTICIDES

What are pesticides?

- Pest control products including herbicides, insecticides, fungicides, rodenticides, etc. that are made from synthetic or naturally occurring ingredients
- Regulated by Health Canada

Why are they tested?

- Hazardous to human health and can have both short- and long-term health effects that most often affect the nervous system

What are the sources of pesticides?

- Raw materials
- Water source

NSLC STANDARD ANALYSIS PARAMETERS | SUGAR

What is sugar?

- Residual sugar is tested
- Residual sugars are what remains in the product post-fermentation

Why is sugar tested?

- Main reason for sugar limits is based on the standard of identity for the products
- Beer – help distinguish beer from malt-based beverages
- Vodka/Dry Gin – ensure standard of identity
- Icewine – ensures only natural sugars are present and the quality profile of the product

How can we control sugar levels?

- Formulations
- Efficient fermentation
- If adding to permitted products, ensure levels are not exceeding limits

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NSLC STANDARD ANALYSIS PARAMETERS | ETHYL CARBAMATE

What is ethyl carbamate?

- Chemical that forms during fermentation
- Reaction of urea and ethanol
- Malolactic fermentation

Why is ethyl carbamate tested?

- Classified as “probably carcinogenic to humans”
- Health Canada has stated it may pose a health risk

What are the factors influencing ethyl carbamate levels?

- Excessive fertilization with urea and nitrogen on grape crops
- Long cooling time during fermentation process
- High temperature and light exposure during storage
- Type of yeast being used in fermentation
- Carrying out malolactic fermentation in winemaking and cidermaking
- Old, aged wine tend to show higher levels as ethyl carbamate forms slowly during aging
- Copper distillation equipment
- Source of ingredients being used

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NSLC STANDARD ANALYSIS PARAMETERS | SYNTHETIC COLOURS (DYES)

What are synthetic colours (dyes)?

- Any organic food colour, other than caramel, that is produced by chemical synthesis and that has no counterpart in nature
- Only permitted in liqueurs and unstandardized beverages (RTDs)

Why are synthetic colours tested?

- Consumer health concerns based on how they are sourced and produced

How can we control synthetic colour levels?

- Ensure they are used properly to prevent exceeding the limits
- Use natural options instead if colour is wanted for a product
- To avoid in products which they are not allowed, review all ingredients to ensure none are present

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NSLC STANDARD ANALYSIS PARAMETERS | FREE AND TOTAL SO_2

What is free and total SO_2?

- A widely used food preservative
- Two of the main purposes: antiseptic and antioxidant
  - Free SO_2
  - Total SO_2

Why are they tested?

- During production:
  - Irritation of the eyes, mucous membranes, skin, and respiratory tract
  - Bronchospasm, pulmonary edema, pneumonitis, and acute airway obstruction
- Issues for people who suffer from chronic pulmonary diseases, such as asthma

How can we control free and total SO_2 levels?

- Establish proper cleaning and sanitation protocols in the production area
- Determine the necessary amount
- Read the technical data sheet provided by the manufacturer
- Keep track of all the additions

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NSLC STANDARD ANALYSIS PARAMETERS | SORBIC ACID

What is sorbic acid?

- An antimicrobial agent mainly used in potassium sorbate form
- Prevent fermentation in bottles by inhibiting the yeasts

Why is sorbic acid tested?

Upon inappropriate usage:

- Side effects such as possible allergies and skin rashes

How can we control sorbic acid levels?

- Determine the necessary amount
- Read the technical data sheet provided by the manufacturer
- Follow the direction of use and recommendations of dosage
- Keep track of all the additions

NSLC STANDARD ANALYSIS PARAMETERS | VOLATILE ACIDITY

What is volatile acidity (VA)?

- A critical parameter for the quality of wine and cider
- Almost entirely consists of acetic acid

What causes volatile acidity?

- Raw fruits (damaged or microbial spoilage)
- Yeast and bacteria activity during fermentations
- Bacterial spoilage
- Barrel aging

How can we control volatile acidity levels?

- Cleaning and sanitation protocols
- Fermentation management
- Minimize the oxygen exposure
- Secure microbial stability of the products

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HOW TO READ YOUR COA

HOW TO READ YOUR COA

Results in Green = Adherence
Results in Yellow = Minor Variance
Results in Red = Major Variance

Minor Variance Examples:

Alcohol > 1.1% from stated label value

Volatile Acidity > 1.3 g/L VA in a table wine

Date Printed: 2022-03-30

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ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

COA ID
NSLC2022033001

Certificate of Analysis

Client Name **Nova Scotia Liquor Corporation**
Client Address 93 Chain Lake Drive
Bayers Lake Business Park
Halifax, NS B3S 1A3

Client Sample Name ALAB Chateau Plonk **(11.5% ABV on Label)**
ALAB Sample Identifier NSLC2022033001 **Lot/Batch Code** ALAB 03/30/2022

Parameter:	Result	Units	LOQ	Method Code	Completion Date
Alcohol	12.7	% Alc./vol	0.5	M018	30-Mar-22
Total SO_2	257.0	mg/L	10	M005	30-Mar-22
Free SO_2	85.0	mg/L	2.5	M005	30-Mar-22
Volatile Acidity	2.00	g/L Acetic Acid	0.1	M004	30-Mar-22
Total Reducing sugar	46.7	g/L Sucrose	1	M003	30-Mar-22
Sorbic Acid	157.0	mg/L	15	M007	30-Mar-22
Ethyl Carbamate	45.0	µg/L	5	M012	1-Apr-22
Arsenic	117	µg/L	10	M014	31-Mar-22
Cadmium	< 2	µg/L	2	M014	31-Mar-22
Cobalt	< 2	µg/L	2	M014	31-Mar-22
Copper	1050.0	µg/L	20	M014	31-Mar-22
Lead	< 20	µg/L	20	M014	31-Mar-22

HOW TO READ YOUR COA

Results in **Green** = Adherence
Results in **Yellow** = Minor Variance
Results in **Red** = Major Variance

Major Variance Examples:

Free SO2 > 70mg/L

Ethyl Carbamate > 30 ug/L

Arsenic > 100 ug/L

Copper > 1000 ug/L

Date Printed: 2022-03-30

ACADIA LABORATORY FOR AGRI-FOOD & BEVERAGE

COA ID
NSLC2022033001

Certificate of Analysis

Client Name **Nova Scotia Liquor Corporation**
Client Address 93 Chain Lake Drive
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Arsenic	117	µg/L	10	M014	31-Mar-22
Cadmium	< 2	µg/L	2	M014	31-Mar-22
Cobalt	< 2	µg/L	2	M014	31-Mar-22
Copper	1050.0	µg/L	20	M014	31-Mar-22
Lead	< 20	µg/L	20	M014	31-Mar-22

PRODUCT TESTING | RESOURCE SUMMARY

The NSLC

- NEW Product Quality Assurance Coordinator Emilie Labossiere
- Certificates of Analysis – *Individualized results available upon request*
- Trade Site- Policy, Training Document, Fact Sheets, Limit Tables
- https://www.mynslc.com/Trade-MyNSLC

Questions about NSLC's Product Testing Program can be directed to Emilie Labossiere at Product.Testing@mynslc.com

Perennia NS

- Support with major variances: assessments and troubleshooting
- Additional quality and food safety resources
- Coaching on QA program development and implementation
- Resources- Fact sheets, publications, videos and webinars
- https://www.perennia.ca/

Questions about Perennia's resources can be directed to innovation@perennia.ca

Acadia Laboratory for Agri-food and Beverage

- Product testing for all beverage alcohol products
- Grapes and hops analysis
- ABV only testing available $25
- https://alab.acadiau.ca/home.html

Questions about ALAB's resources can be directed to alab@acadiau.ca

THANK YOU