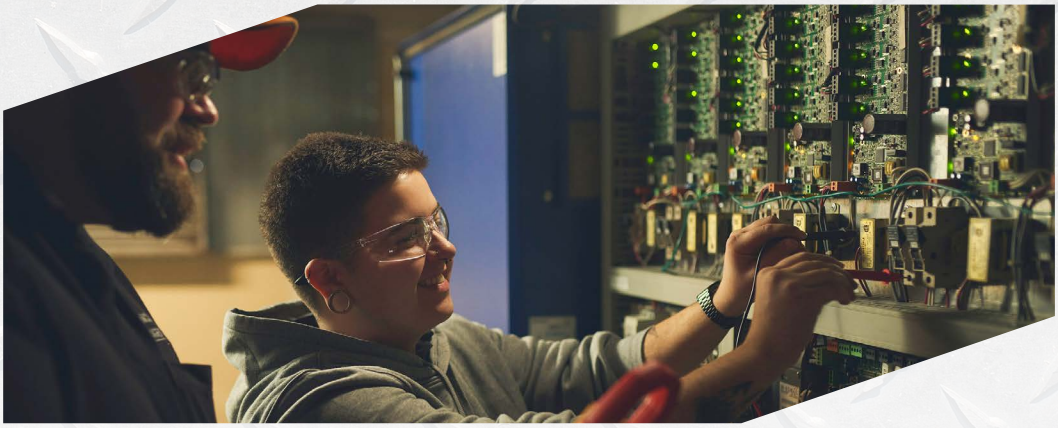
Curriculum Standard Plan of Training

Blaster

March 2015



Newfoundland & Labrador

Preface

This document describes the curriculum content for the Blaster training program and outlines each of the technical training units necessary for the completion of certification.

Acknowledgements

The Provincial Advisory Committee (PAC), industry representatives, instructors and department staff provided valuable input to the development of this provincial plan of training. Without their dedication to quality training, this document could not have been produced.

We offer a sincere thank you.

Contact Information

Department of Education and Early Childhood Development
Apprenticeship and Trades Certification Division
Tel: 709-729-2729
Toll Free: 1-877-771-3737
Email: app@gov.nl.ca
Web: www.gov.nl.ca/atcd

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Approved	March, 2015	March, 2015	New version released upon decertification of trade from apprenticeship
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Table of Contents

A. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark.

The order of course delivery can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Training for this program is modelled on a 30 hour class week

Upon completion of this training program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

In order to ensure the skill level of students for endorsement of practical hours necessary to write the level I certification exam, the student to instructor ratio for practical training cannot exceed 8:1.

LEVEL I CERTIFICATION COURSES

NL Course No.	Course Name	Hours		Pre-Requisite
		Theory	Practical*	
BL1800	Blaster Shop Fundamentals	60	-	None
BL1810	Drilling	15	90	BL1800
BL1820	Introduction to Blasting	30	90	BL1800
BL1830	Advanced Blasting	15	60	BL1820
Total Hours		**360**		

* Practical hours are a mandatory training component. The instructor must endorse the hours and required blasts in the student's field journal to allow eligibility to write the level 1 certification exam at the end of the Level 1 training program.

Required Practical Experience in training program

240 Hours and a minimum of two (2) blasts completed under the supervision of a level III blaster who is designated as an approved instructor at an approved training facility.

Certification Exam
Level I

Required Work Experience

One thousand (1000) hours of practical experience as a Certified Blaster Level I. Experience must be verified by the certified blaster and the employer, using the NL Blaster Field Journal; and

Two (2) blasts within 1000M of an occupied structure under the supervision of a certified Level II or higher blaster

Certification Exam
Level II

Required Work Experience

One thousand (1000) hours of practical experience as a Certified Blaster Level II. Experience must be verified by the certified blaster and the employer, using the NL Blaster Field Journal; and

Five (5) blasts within 30M of an occupied structure under the Supervision of a certified level III blaster

Certification Level III
No exam required

Blaster Level 1

BL1800 Blaster Shop Fundamentals

Learning Outcomes:

- Demonstrate an understanding of the Blaster occupation with respect to various codes and regulations.
- Demonstrate an awareness of potentially harmful situations.
- Demonstrate an awareness of conservation and environmental issues.

Duration: 60 hours

Prerequisite(s): None

Objectives and Content:

1. Demonstrate an awareness of Personal work safety.
   - i. protective clothing
   - ii. protective equipment
   - iii. good housekeeping
   - iv. safe lifting techniques
   - v. physical and mental fitness
   - vi. safety knowledge
   - vii. accident reporting
   - viii. safety meetings

2. Demonstrate an understanding of Standard First Aid.
   - i. Complete Standard First Aid and CPR Course

3. Demonstrate an understanding of WHMIS
   - i. Complete WHMIS training

4. Demonstrate an understanding of Power Line Hazards.
   - i. Complete Power Line Hazards training

5. Demonstrate an awareness of Traffic Control procedures.

6. Demonstrate an awareness of confined spaces procedures.

7. Demonstrate an awareness of trench safety procedures.

8. Identify elements of the Federal Explosives Act.

    i. Magazine requirements
    ii. Explosive Regulatory Division (ERD) Directives

9. Interprets Occupational Health and Safety Act and Regulations.
    i. identify and interpret the regulation that apply to the driller/blaster industry
    ii. identify and interpret the general safety precautions as they relate to tools and equipment, personal safety, and overall safety on the job

10. Interpret the Transportation of Dangerous Goods Act.
    i. employers responsibility under the TDGCA
        - training
        - handling
        - shipping
        - transporting
        - action in case of spills, leaks, incorrect packaging
    ii. substances in the blaster industry to which TDGCA legislation applies
    iii. exemptions under the TDGCA legislation as they apply to substances used in the blaster industry
    iv. municipal restrictions on the transportation of dangerous goods.

11. Demonstrate a knowledge of fire safety.
    i. specify the essential elements of fire
    ii. identify the types of fire
    iii. list the types of fire extinguishers and demonstrate the use
    iv. practice fire prevention as it relates to blaster
    v. identify inherent dangers of fire in the blaster industry, particularly as it relates to fires in a vehicle carrying explosives, fires caused by blasting and fires in the vicinity of explosive storage areas.
    vi. obtain and interpret local fire regulations
    vii. transport, store and handle flammable materials, liquids, and gases
    viii. refuel motorized equipment

12. Identify procedures to ensure the safety of a job site.
    i. posts public notice of blasting activities
    ii. installs safety barriers, etc. as required
    iii. maintains clean job site
    iv. provides security for tools, equipment and explosives
    v. prepares safe work procedures documentation

13. Demonstrate a knowledge of the Blasters field journal.
    i. record identifying information

ii. identify the components of the log
iii. maintain a blast log
iv. complete a blasting incident report
v. complete a journal summary report

Practical Requirements:

1. Use all appropriate portions of a blasters field journal to log blasts and hours completed during Level 1 certification training.

BL1810 Drilling

Learning Outcomes:

- Demonstrate the ability to carry out drilling operations in a safe and competent manner.
- Demonstrate knowledge of the tools and equipment used in drilling relative to the Blasting occupation.
- Demonstrate an appreciation for conservation and environmental issues.

Duration: 105 hours

Prerequisite(s): BL1800

Objectives and Content:

1. Describe safety, use, and maintenance requirements for using a drilling machine.

2. Explain the process of changing steels when hole drilling with an airtrac.

3. Describe the drill string and accessories.

4. Identify the various types of bit grinders and sharpeners.

5. Outline the procedures used in underwater drilling

6. List the advantages and disadvantages of angle drilling, vertical drilling, and horizontal drilling.

7. Identify safety procedures to be followed during drilling.

8. Explain the various glossary terms used in drilling terminology.

9. Demonstrate a knowledge of basic geology.
   i. describe the three main types of rocks
   ii. recognize the basic rocks and minerals of Newfoundland
   iii. explain the relationship between the hardness of rock and its fragmentation
   iv. know how the geological structure affects blasting operations

Practical Requirements:

1. Use a drilling machine.
   i. maneuver a drilling machine in difficult areas
   ii. perform basic drill maintenance
   iii. diagnose and correct problems with air trac operations
   iv. load and unload an air trac machine and compressor on a flat bed float
   v. start and operate a drill
   vi. shut down a drill in an emergency
   vii. practice preventative maintenance on equipment

2. Drill blastholes.
   i. Perform a drilling operation
   ii. follow safety procedures while drilling
   iii. change steels on a drilling machine

BL1820 Introduction to Blasting

Learning Outcomes:

- Demonstrate the ability to carry out blasting operations in a safe and competent manner.
- Demonstrate knowledge of the tools and equipment required in the Blaster occupation.
- Demonstrate an appreciation for conservation and environmental issues.

Duration: 120 hours

Prerequisite(s): BL1800

Objectives and Content:

1. Demonstrate a knowledge of math to perform
   i. volume calculations
   ii. Pythagoras theorem calculations
   iii. loading densities

2. Explain the various glossary terms used in blasting terminology.

3. Describe the effects of blasting on various types of geological material.

4. Describe the effects of jointing and bedding in blasting operations.

5. Describe the use of a blasters galvanometer and multimeter.

6. Describe the major types of blasting machines.

7. Describe the use of a blasting machine.

8. Describe the use of a blasting multi meter.

9. Describe blasting accessories such as powder punches, retrievers and loading poles.

10. Describe the historic development of explosives.

11. List the types and uses of explosives.

12. Describe explosive case histories.

13. Explain the following properties of explosives:
    i. strength
    ii. velocity of detonation
    iii. sensitivity
    iv. density
    v. sensitiveness

14. Explain the following explosive physical characteristics:
    i. water resistance
    ii. resistance to freezing
    iii. storage qualities
    iv. fumes produced
    v. flammability

15. Explain blasting effects.
    i. rock fragmentation
    ii. rock displacement
    iii. ground vibration
    iv. air blast
    v. fly rock

16. Describe the various types of electric initiation systems.
    i. short period detonators
    ii. long period detonators
    iii. instantaneous detonators
    iv. magnadets

17. Describe the various types of initiation systems and their uses.

18. Explain how to prevent misfires.

19. Describe safety practices to dispose of misfires.

20. Explain stemming and it’s uses.

21. Describe field tests to determine the geology of the blast site.

22. Demonstrate a knowledge of electric blasting calculations:
    i. single-series circuit
    ii. parallel circuit
    iii. parallel-series circuit

Practical Requirements:

1. Design a blast.
   i. identify and record changes during drilling, such as the presence of voids, mud seams, and changes to rock foundations

2. Select a suitable drill pattern.
   i. select the proper pattern to coincide with the geology of the material to be broken

3. Select drill depth, blasthole diameter and subgrade.
   i. select the blasthole diameter
   ii. select the proper subdrill distance
   iii. select the depth of the blasthole

4. Store, transport and handle explosives.
   i. maintain a blasting explosives magazine
   ii. maintain a detonator magazine
   iii. store blasting explosives both safely and logically
   iv. transport explosives according to regulations

5. Preparing a blast.
   i. lay out a blast pattern
   ii. measure burdens and spacings
   iii. adjust drilling pattern for optimum results

6. Load blast holes.
   i. assess blast hole condition prior to loading and take any necessary corrective action
   ii. secure the site prior to the blast
   iii. be responsible for site supervision prior to the blast
   iv. make up and load primers
   v. load the main column charge in the blast hole by hand
   vi. assess the collar distance and adjust accordingly

7. Hook up and fire shot.
   i. hook up the blast using the various types of initiation systems.
   ii. carry out the final safety check
   iii. practice safety during the blast
   iv. carry out the post blast inspection
   v. properly dispose of misfires

8. Destroy unwanted explosives.
    i. distinguish between usable and deteriorated explosives
    ii. safely destroy explosives by detonation
    iii. safely destroy explosives by burning

9. Perform a blast using blasting mats.

BL1830 Advanced Blasting

Learning Outcomes:

- Demonstrate the skills and knowledge required to carry out specialized blasting operations in a safe and competent manner.
- Demonstrate an appreciation for conservation and environmental issues.

Duration: 75 hours

Prerequisite(s): BL1820

Objectives and Content:

1. Describe the electronic initiation system.

2. Identify trends and new technologies in initiation systems.

3. Describe methods of blasting.
   - i. trench cuts
   - ii. mudcapping
   - iii. blockholing
   - iv. air cushion
   - v. sinking cuts
   - vi. hillside or sliver cuts
   - vii. rock cuts
   - viii. armour stone

4. Explain borehole loading.
   - i. describe situation when decking may be used.
   - ii. describe the problems encountered in loading wet boreholes.
   - iii. explain why subdrilling is required in certain blast situations.

5. Describe controlled blasting.
   - i. explain correct drilling techniques for pre-shearing.
   - ii. explain the advantages of trim or cushion.
   - iii. describe a blasting situation where line drilling might be used.
   - iv. outline the circumstances that may contribute to excessive flyrock

6. Explain how to measure ground vibrations.
   i. describe the basic workings of a seismograph machine.
   ii. describe the setting up of a seismograph machine.
   iii. outline the types of information that can be gained from a seismograph machine.

7. Explain the relationship between scaled distance and the use of a seismograph machine.
   i. explain scaled distance formula and its application.
   ii. explain how to adjust scaled distance with the use of a seismograph.

8. Describe the use of bulk loading systems.

9. Explain how controlled blasting can eliminate back break and end break.

10. Describe specialized blasting operations.
    i. use explosives for demolition purposes
    ii. use explosives underwater
    iii. blast under water using the drill end blast method

Practical Requirements:

1. Perform pre–blast preparation.
   i. select and layout drill patterns
   ii. select electric or non-electric blasting systems

2. Carry out wet hole loading.
   i. select explosives for loading wet holes
   ii. carry out dewatering of holes

3. Determine the powder factor.
   i. show that geology of the rock to be broken is important in determining the powder factor
   ii. relate the blast pattern to the powder factor
   iii. accurately calculate the powder factor
   iv. calculate the toe and column load

4. Perform secondary blasting methods.
   i. mudcapping as an effective confinement technique
   ii. blockholing
   iii. snakeholing
   iv. set up an air-cushioned blast

5. Perform a sinking cut.

6. Blast trenches for pipelines, sewage and water lines.

7. Blast smooth walls using pre-shearing techniques.

B. Requirements for Provincial Certification in the Blaster Occupation

The requirements for certification as a Blaster at each level are outlined below:

LEVEL I

1. A candidate for certification as a Blaster Level I shall be in completion of a prescribed plan of training for level I blasters. This is achieved through formal schooling; and

2. Shall complete a level I certification exam, at a time designated by the department.

LEVEL II

1. A candidate for certification as a Blaster Level II shall hold a Blasters Certificate Level I; and

2. Shall have one thousand (1000) hours of practical experience as a Certified Blaster Level I. Experience must be verified by the certified blaster and the employer, using the NL Blaster Field Journal; and

3. Shall have completed two (2) blasts within 1000M of an occupied structure under the supervision of a certified Level II or higher blaster; and

4. Shall complete a level II certification exam, at a time designated by the department

LEVEL III

1. A candidate for certification as a Blaster Level III shall hold a Blaster Certificate Level II; and;

2. Shall have one thousand (1000) hours of practical experience as a Certified Blaster Level II. Experience must be verified by the certified blaster and the employer, using the NL Blaster Field Journal; and

3. Shall have Five (5) blasts within 30M of an occupied structure under the Supervision of a certified level III blaster.

NOTE: A Certificate at any level is valid for a five (5) year period from the date of issue, and is eligible for renewal for a 5 year period from the date of each expiry. Certificates may be extended for up to (1) one additional year at the discretion of the Director. Blasters will be required to successfully complete a safety seminar as designated by the department.

C. Roles and Responsibilities of Stakeholders in the certification process

The certification process involves a number of stakeholders playing significant roles in the training of certified blasters. This section outlines these roles, and the responsibilities resulting from them.

The Blaster:

- Completes all required approved technical training courses.
- Finds appropriate employment.
- Completes all required work experiences in combination with the required hours.
- Ensures work experiences are well documented.
- Approaches blaster certification with an attitude and commitment that fosters the qualities necessary for a successful career as a certified blaster.

The Employer:

- Provides high quality work experiences in an environment conducive to learning.
- Provides feedback to training institutions, the Occupational Health and Safety Division, the Apprenticeship and Trades Certification Division, and blasters in an effort to establish a process of continuous quality improvement.
- Where appropriate, ensures work experiences are accomplished at an appropriate pace which reflects the blasters abilities and worksite conditions.
- Ensures work experiences of the blaster are documented.

The Training Institution:

- Provides a high quality learning environment.
- Provides the necessary student support services that will enhance a blaster's ability to be successful.
- Participates with other stakeholders in the continual updating of programs.

The Provincial Government:

- Establishes and maintains a program advisory committee.
- Maintains a current training curriculum.
- Develops and administers certification examinations.
- Provides appropriate certified blaster identification.
- Schedules renewal training, where required, for certified blasters.
- Promotes occupational training as a viable career option to prospective blasters and other appropriate persons involved.
- Verifies that all individuals performing blasting operations hold an appropriate blaster certification level.

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