Régie de l'énergie du Canada | Canada Energy Regulator

Dynamitage, sécurité et pipelines

Il arrive que des activités de dynamitage soient nécessaires pour faciliter la construction d'infrastructures, de routes ou d'autres types d'ouvrages. En raison de la présence de roches dures dans diverses régions du nord de la Caroline du Sud, le dynamitage est parfois le seul moyen de faciliter les travaux de construction. Avant toute opération de dynamitage, il est essentiel d'appeler le SC811 afin que les services publics puissent marquer leurs lignes.

Canada

Protection du pipeline contre les opérations minières

338 (1) Sauf si le responsable désigné, par ordonnance, l'autorise, la prospection et l'exploitation de gisements sont interdites, dans un rayon de quarante mètres du pipeline ou des ouvrages connexes.

Règlement sur l'exploitation minière au Canada

mine – signifie un travail ou une entreprise au cours desquels un minéral ou minerai est extrait du sol ou d'un talus par quelque méthode que ce soit; ce terme comprend les ouvrages, les broyeurs, les concentrateurs, l'outillage, les installations et les constructions situés sur ou dans le sol, appartenant à la mine ou utilisés à cette fin; (mine)

minéraux – Métaux précieux et usuels et autres substances naturelles exploitables. Ne sont pas considérés comme des minéraux :

a) la houille, le pétrole et les hydrocarbures connexes, le soufre natif, la pierre de construction, la pierre pour sculpture, le calcaire, la stéatite, le marbre, le gypse, le shale, l'argile, le sable, le gravier, les cendres volcaniques, la terre, l'ocre, la marne et la tourbe;

b) toute autre substance régie par le Règlement territorial sur la houille, le Règlement territorial sur le dragage ou le Règlement sur l'exploitation de carrières territoriales. (mineral)

Vidéo – Dynamitage en vue de la poste d'une canalisation

https://www.youtube.com/watch?v=s_r8_n9BI0A&feature=youtu.be

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Documents de sensibilisation du public de la société

La sécurité des pipelines est une responsabilité partagée.

Les travaux de construction et d'excavation non autorisés sont les principales causes de dommages aux pipelines et peuvent avoir des conséquences graves, voire mortelles. Le pipeline PNTI n'est qu'un des nombreux réseaux souterrains que vous pouvez rencontrer.

La loi exige d'obtenir une autorisation avant d'entreprendre des activités telles que :

l'installation de clôtures, de poteaux ou de piquets.

La construction de piscines hors terre ou creusée

L'installation de systèmes de drainage ou d'irrigation

L'aménagement paysager.

Le pavage, le dynamitage et l'excavation.

Une autorisation est également requise pour conduire des véhicules ou des engins lourds hors d'une voie publique afin de traverser l'emprise.

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Règlement de la Régie canadienne de l'énergie sur la prévention des dommages aux pipelines (régime d'autorisation)

Activités occasionnant le remuement du sol

10 (3) – Mesures

(3) Toute personne qui exerce une activité qui occasionne le remuement du sol dans la zone réglementaire doit prendre les mesures suivantes :

a) veiller à ce que l'activité soit **exercée conformément aux modalités techniques** énoncées dans la demande de consentement qui ont été **acceptées par la compagnie pipelinière** et conformément aux **conditions énoncées dans le consentement**, notamment celles imposées à l'égard d'un forage directionnel ou de **l'utilisation d'explosifs**;

Canada

L'importance des ingénieurs

Webinar Series - Impact of Blasting on Your Pipeline

Close in Blasting Stress

Esparza Equation for Point Source

$$\sigma_{cir} = \sigma_{long} = 4.44\left(\frac{n \cdot W}{\sqrt{E} \cdot t \cdot R^{2.5}}\right)^{0.770} \cdot E$$

n is the powder factor (the ratio of the energy of the explosive to the same weight of ANFO)
W is the charge per delay, lbs
E is the elastic modulus of the pipe (29.5×10^6 to 30×10^6 psi)
t is the pipe wall thickness, in
R is the distance between the closest charge and the pipeline, ft

- The hoop and longitudinal stress are usually assumed to be equal

Explosive	n
ANFO (94/6)	1.00
AN Low Density Dynamite	0.99
Comp B (60/40)	1.12
Comp C-4	1.12
HBX-1	0.83
NG Dynamite (40%)	1.05
NG Dynamite (60%)	1.12
Pentolite (50/50)	1.11
RDX	1.16
TNT	0.98

Typical powder factors for some commercial explosives

Esparza, E, Westine, P. and Wenzel, A. "Pipeline responses to buried explosive detonations", Volume II – Technical Report, Southwest Research Institute, 1981

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Webinar Series - Impact of Blasting on Your Pipeline

Close in Blasting

Esparza Equation for Point Source – General Equation

- Peak radial ground particle velocity

$$U = \frac{0.00617\left(\frac{W_e}{\rho \cdot c_p^2 \cdot R^3}\right)^{0.852} \cdot c_p}{\tanh\left(26.0\left(\frac{W_e}{\rho \cdot c_p^2 \cdot R^3}\right)^{0.300}\right)} \cdot \left(\frac{\rho \cdot c_p^2}{p_0}\right)^{0.5}$$

U Peak radial ground particle velocity, ft/sec
c_p is the p-wave velocity of the soil or rock, ft/sec
p_0 is the atmospheric pressure, lb/ft^2
R is the standoff distance, ft
W_e is the explosive energy release given in the explosive data sheet, ft.lb
ρ is the mass density of the soil or rock, slug/ft^3 (or equivalently lb.sec^2/ft^4)

Explosive	W_e (ft-lb/lb$_{ANFO}$)
AN Low Density Dynamite	1.50×10^6
ANFO (94/6)	1.52×10^6
Comp B (60/40)	1.70×10^6
Comp C-4	1.70×10^6
HBX-1	1.30×10^6
NG Dynamite (40%)	1.59×10^6
NG Dynamite (60%)	1.70×10^6
Pentolite (50/50)	1.68×10^6
RDX	1.76×10^6
TNT	1.49×10^6

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Figure 21: Blasting Under two high pressure gas pipelines, TransCanada Pipelines. Note 2x4 wood lagging around hotlines and blasting mats on top.

https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2487998/B240-7_-_Trans_Mountain_Response_to_NEB_IR_No.2.134a-Attachment_1_Part_3of5_-_A3Z4Y4.pdf?nodeid=2487507&vernum=-2

https://www.fraserdrillblast.com/blasting-services

Dynamitage en vue de la poste d'une canalisation

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Matrice récapitulative des activités de dynamitage à proximité immédiate

Close Proximity Blasting Summary Matrix	Close Proximity Blasting **Level 0** 0m to 3m (0 to 10')	Close Proximity Blasting **Level 1** >3m to 10m (>10' to 33')	Close Proximity Blasting **Level 2** >10m to 30m (>33' to 100')	Close Proximity Blasting **Level 3** >30m to 100m (>100' to 330')	Close Proximity Blasting **Level 4** >100m to 500m (>330' to 1600')
Blast Design & Control Blasting Plan	• Close Proximity Blasting Manager with 10 or more years' experience. • Suggested oversight from an independent Blasting Consultant	• Close Proximity Blasting Manager with 7 or more years of experience. • Suggested oversight from an independent Blasting Consultant	• Close Proximity Blasting Manager with 5 or more years of experience suggested to design, develop and accept site Control Blasting Plan	• Certified Close Proximity Blaster suggested to design, develop site Control Blasting Plan	• Certified Close Proximity Blaster suggested to design, develop site Control Blasting if blasting activities are within 500m (1600') of school, hospital or clinic
Peak Particle Velocity & Frequency Response	• Blast designed to 50 mm/sec (2 inches/sec) at CP Level 1 distance. • Blast designed to maximize Frequency.	• Blast designed to 50 mm/sec (2 inches/sec) or in accordance with the USBM table in Appendix A	• Blast designed to 35 mm/sec (1.4 inches/sec) or in accordance with the USBM table in Appendix A	• Blast designed to 25 mm/sec (1 inch/sec) or in accordance with the USBM table in Appendix A	• Blast designed in accordance with the USBM table in Appendix A
Air Overpressure	• Maximum 134dBL	• Maximum 134dBL	• Maximum 134dBL	• Maximum 134dBL	• Maximum 134dBL
Blast Hole Diameter	• Suggested 45mm (1 ¾") blast hole diameter maximum • Max 70mm (2 ¾") blast hole diameter where explosive decking/decoupling is utilized.	• Suggested 45mm (1 ¾") blast hole diameter maximum • Max 70mm (2 ¾") blast hole diameter where explosive decking/decoupling is utilized.	• 70mm (2 ¾") blast hole diameter suggested maximum	• 75mm (3") blast hole diameter suggested maximum	• At the discretion of the Blaster
Blast Hole Length	• Governed by charge weight per delay to meet suggested PPV and frequency limit.	• Governed by charge weight per delay to meet suggested PPV limit	• Governed by charge weight per delay to meet suggested PPV limit	• Governed by charge weight per delay to meet suggested PPV limit	• Governed by charge weight per delay to meet suggested PPV limit
Explosives	• Directed by the Close Proximity Blasting Manager based on blast design and structure type. • ANFO/bulk products not recommended.	• Packaged explosive to a max 38mm (1 1/2") diameter • ANFO/bulk products not recommended below critical hole diameter for product.	• Packaged explosive to a max 50mm (2") diameter • ANFO/bulk products to be utilized in accordance with manufacturers specifications	• At the discretion of the Blaster • ANFO/bulk products to be utilized in accordance with manufacturers specifications	• At the discretion of the Baster • ANFO/bulk products to be utilized in accordance with manufacturers specifications
Detonators	• Electronic detonators suggested.	• Electronic detonators suggested	• Electronic detonators suggested Type of detonator utilized at the discretion of the Blaster	• Type of detonator utilized at the discretion of the Blaster	• Type of detonator utilized at the discretion of the Blaster
Fly Rock Control	• Adequate Blast Design • Use of a confinement device or clear crushed rock stemming. • Adequate blast matting or earth fill.	• Adequate Blast Design • Use of a confinement device and/or clear crushed rock stemming • Adequate blast matting or earth fill	• Adequate Blast Design • Use of a confinement device and/or clear crushed rock stemming • Adequate blast matting or earth fill	• Adequate Blast Design • Use of a confinement device and/or clear crushed rock stemming • Adequate blast matting or earth fill	• Adequate Blast Design • Use of a confinement device and/or clear crushed rock stemming • Blasting mats suggested within 300m (1000') • Adequate mating or earth fill
Pre-Blast Survey	• Suggested for all Close Proximity structures within 30m (100') of the blasting limits.	• Suggested for all Close Proximity structures within 30m (100') of the blasting limits	• Suggested for all inhabited structures within 75m (250') of the blasting limits	• Suggested for all inhabited structures within 75m (250') of the blasting limits	• At the discretion of the Blaster
Community Notification	• 48 hours notification for all inhabited structures within 30m (100') of the blasting limits. • Blasting schedule to be coordinated with schools, hospitals and clinics within 150m (500') of blasting limits.	• 48 hours notification for all inhabited structures within 30m (100') of the blasting limits • Blasting schedule to be coordinated with schools, hospitals and clinics within 150m (500') of blasting limits	• 48 hours notification for all inhabited structures within 75m (250') of the blasting limits • Blasting schedule to be coordinated with schools, hospitals, and clinics within 150m (500') of blasting limits	• 48 hours for all inhabited structures within 100m (330') and/or School/Hospitals within 300m (1000') of the blasting limits • Blasting schedule to be coordinated with schools, hospitals and clinics within 300m (1000') of blasting limits	• 48 hours for School/Hospitals within 500m (1600') of the blasting limits. • Blasting schedule to be coordinated with schools, hospitals and clinics within 500m (1600') of blasting limits
Monitoring	• Monitor as per CP1 distance. • Suggested use of a high frequency geophone.	• Follow ISEE Field Practice Guidelines for Seismographs. • Monitoring at the 2 nearest Close Proximity structures.	• Follow ISEE Field Practice Guidelines for Seismographs. • Monitoring at the 2 nearest Close Proximity structures.	• Follow ISEE Field Practice Guidelines for Seismographs. Monitoring at the 2 nearest Close Proximity structures.	• Follow ISEE Field Practice Guidelines for Seismographs. • Monitoring at the nearest Close Proximity structure. Additional monitoring as suggested

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Notification aux communautés des activités de dynamitage

Community Notification of Blasting Operations

Commencement of Blasting Notifications

Notification of residents or owners should involve delivering a brochure or letter in person that contains the following information:

1. Project description, location and purpose.
2. Anticipated start and completion dates.
3. Anticipated blasting times and number of daily blasts.
4. How or if they will be notified for each blast.
5. Blasting Contractor's name and contact information.
6. Name of the person conducting the Pre-Blast survey (if suggested).

Inhabited Structures & Close Proximity Structures

It is best practice that residents or owners of all Close Proximity structures be notified in person at least 48 hours prior to the commencement of drilling and blasting activities in accordance with the following matrix:

Notification of Residents or Owners	
CP Level 0 **0 to 3m**	48-hour notice for all residents and owners of Close Proximity structures within ***30m*** (100') of the blasting limits.
CP Level 1 **>3m to 10m**	48-hour notice for all residents and owners of Close Proximity structures within ***30m*** (100') of the blasting limits.
CP Level 2 **>10m to 30m**	48-hour notice for all residents and owners of Close Proximity structures within ***75m*** (250') of the blasting limits.
CP Level 3 **>30m to 100m**	Suggested for all inhabited structures within ***100m*** (330') of the blasting limits.
CP Level 4 **>100m to 500m**	Notifications conducted at the discretion of the Blaster.

Notification of Schools and Medical Treatment Facilities

Schools, clinics & hospitals and other such medical treatment facilities may be especially sensitive to blasting activities. It is best practice to ensure that these facilities are notified in person at least 48 hours prior to the commencement of drilling and blasting activities in accordance with the following matrix:

Notification of Schools & Medical Treatment Facilities	
CP Level 0 **0 to 3m**	48-hour notice for all schools, clinics & hospitals within ***150m*** (500') of the blasting limits.
CP Level 1 **>3m to 10m**	48-hour notice for all schools, clinics & hospitals within ***150m*** (500') of the blasting limits.
CP Level 2 **>10m to 30m**	48-hour notice for all schools, clinics & hospitals within ***150m*** (500') of the blasting limits.
CP Level 3 **>30m to 100m**	48-hour notice for all schools, clinics & hospitals within ***300m*** (1000') of the blasting limits.
CP Level 4 **>100m to 500m**	48-hour notice for all schools, clinics & hospitals within ***500m*** (1600') of the blasting limits.

Blast Notification

Some schools, medical treatment facilities and other stakeholders may be sensitive to blasting operations and may require specified notification of all daily blasting activities.

It is best practice for the Close Proximity Blasting Manager to coordinate the blasting schedule accordingly to accommodate these types of facilities to ensure blasting does not interfere with sensitive procedures, processes and school children.

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Surveillance des entrepreneurs

Arkansas 2017 –Pipeline Blasting -Dykon Blasting

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