APPENDIX K

BLASTING PLAN FOR THE
HUBLINE/EAST TO WEST PROJECT

Algonquin Gas Transmission, LLC

HubLine/East to West Project

Blasting Plan

MAY 2008

TABLE OF CONTENTS

			Page
1.0	Introduction		K-1
2.0	Project Alignment		K-3
3.0	Geologic Setting		K-3
	3.1	Physiography	K-3
	3.2	Topography	K-4
	3.4	Subsurface Geology	K-6
	3.5	Active Faults	K-8
	3.6	Bedrock (less than five feet below the surface)	K-8
	3.7	Soil Hazards	K-9
4.0	Pre-Blast Inspection		K-9
5.0	Monitoring of Blasting Activities		K-9
6.0	Blasting Specifications		K-11
	6.1	General Provisions	K-11
	6.2	Storage Use at Sites	K-13
	6.3	Pre-Blast Operations	K-14
	6.4	Discharging Explosives	K-16
	6.5	Waterbody Crossing Blasting Procedures	K-17
	6.6	Disposal of Explosive Materials	K-18
	6.7	Blasting Records	K-18
7.0	Post-Blast Inspection		K-19

1.0 Introduction

This Blasting Plan ("Plan") describes the blasting program that will be implemented during construction of the Algonquin Gas Transmission, LLC ("Algonquin") HubLine/East to West Project ("E2W Project" or "Project"). This Plan addresses blasting for the proposed route alignment to be filed with the Federal Energy Regulatory Commission ("FERC") in May 2008.

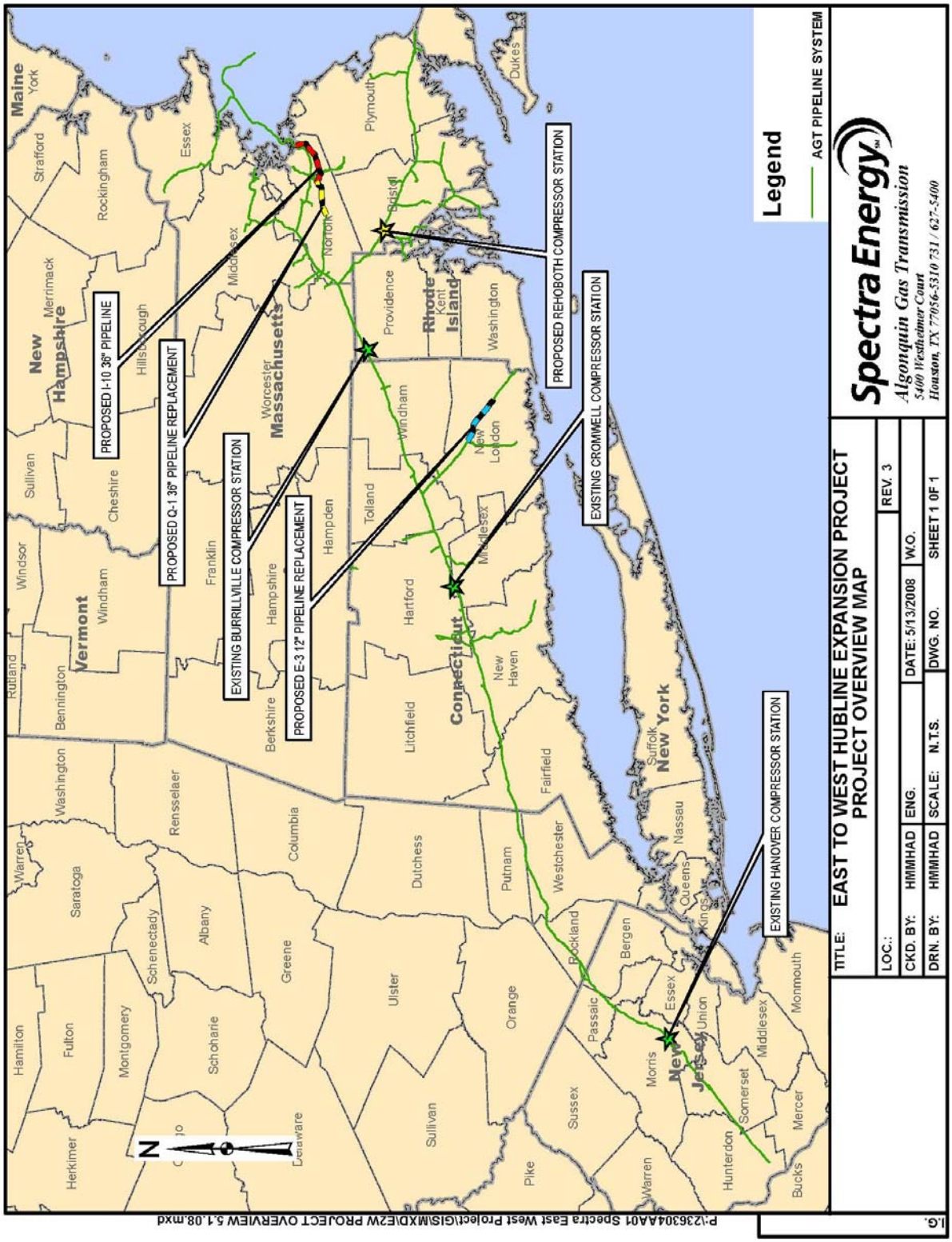
This Plan includes a brief description of the pipeline alignment, and overall physiological setting and bedrock geology in the vicinity of the project. Information on shallow to bedrock soils and bedrock outcroppings is taken from the local published soil maps (and unpublished maps in progress) as acquired from the Natural Resources Conservation Service ("NRCS"). General bedrock type is also discussed. A map depicting the location of the E2W Project pipeline route is provided in Figure 1-1.

Information for blast and rip characteristics of the bedrock may be evaluated at least in a general sense, and applied towards an appropriate bedrock excavation method. The hard and intact nature of the unweathered igneous bedrock (basalts and granites) and metamorphic bedrock (slates, phyllites, schists and quartzites) dictate what blasting methods will be utilized. Soft bedrock, such as sedimentary or weathered igneous and metamorphic rock, may possibly be removed by ripping. The relative scarcity of soft sedimentary rock in New England suggests that ripping will be limited to weathered zones. Weathered bedrock is highly variable, as glaciation has removed most of the weathered rock that existed. Weathered zones generally occur in pockets that were protected from the ice.

Other geologic features may control the effects of blasting. Rock fabric, or the arrangements of minerals, determines intrinsic rock strength, and thus influences rock excavation. Joint spacing, bedding, and foliation also influence rock excavation. Lithologic generalizations of New England rock type include:

- granitic rock is invariably resistant, except where weathered.
- granulitic (high temperature-high pressure metamorphic rock with gniessic texture) and migmatitic (cooled rock having reached the boundary between metamorphism and magmatism) rock are also equally resistant.
- ultramafic (rich ferromagnesium) rocks are highly fractured and almost always require blasting. Other metamorphic rock along the geothermal gradient may have a wide range of susceptibility to blasting or ripping. It is the most difficult to predict of the hard rocks. Degrees of intensity of metamorphism can be further deduced from the minerals that schists contain; and
- sedimentary rock is generally amenable to ripping.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved



Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

2.0 Project Alignment

The proposed Project consists of:

a) I-10 Extension – construct approximately 12.9 miles of new 36-inch-diameter pipeline from milepost ("MP") 0.0 in the Town of Weymouth to MP 12.9 in the Town of Canton, Norfolk County, Massachusetts.

b) Q-1 System – install approximately 7.5 miles of 36-inch-diameter pipeline that will replace a segment of an existing 24-inch-diameter pipeline from MP 12.2 in the Town of Sharon to MP 19.7 in Canton, Norfolk County, Massachusetts.

c) E-3 System – install approximately 11.0 miles of 12-inch-diameter pipeline that will replace a segment of an existing 6- and 4-inch-diameter pipeline from MP 0.0 in the City of Norwich to MP 11.0 in the Town of North Stonington, New London County, Connecticut.

d) Installation of ancillary facilities for the pipeline which will consist of compressor stations, meter stations, mainline valves, and other appurtenant facilities.

3.0 Geologic Setting

3.1 Physiography

The geology of the Project area is comprised of glacial deposits overlying bedrock formed by continental collisions and subsequent expansion. The following summarizes the physiography, topography, and the surficial and subsurface geology of the Project area. Resource Report 6 provides additional information on geology.

Massachusetts

Physiography of most of the Massachusetts portions of the E2W Project is typified by local glacial deposits overlying resistant, heavily altered and folded crystalline and metamorphic bedrock with few sedimentary bedrock occurrences. The nature of metamorphic and crystalline bedrock in Massachusetts limited the scale and occurrence of glacial deposits such as drumlins and moraines. This resulted in rolling till-covered uplands and flatter lowland areas that represent valleys filled with glacial outwash, finer glacial sediments, and more recent alluvial or swamp deposits. In the southeast portion of Massachusetts, where the Rehoboth Compressor Station is proposed, bedrock is comprised of less-resistant sedimentary rock. This terrain provided less resistance to glacial advance than elsewhere in Massachusetts, resulting in a generally flatter landscape with many areas of ground moraine.

All Rights Reserved

Connecticut

Connecticut geology can be loosely divided into Eastern and Western Uplands divided by a Central Valley where the Connecticut and Quinnipiac Rivers flow. Upland areas consist of folded and altered crystalline and metamorphic bedrock blanketed by till with limited glacial outwash and finer deposits. geologic structure of these areas formed during collisions of continental land masses. The Central Valley is a rift valley that formed during the separation of Pangea and contains a greater array and dispersion of glacial outwash sediments and finer glacial lake bottom sediments. Continental collisions resulted in the hilly nature of the topography in the area of the E-3 System.

3.2 Topography

Massachusetts

The topography of the I-10 Extension pipeline route generally consists of rolling terrain ranging in elevation from approximately 0 feet (where the pipeline extends across the Weymouth Fore River) to 90 feet. The topography of the Q-1 System pipeline route generally consists of rolling terrain ranging in elevation from approximately 40 feet to 120 feet, but is primarily within the 40- to 90- foot elevation range. The Q-1 System pipeline route traverses slightly more hilly terrain from MP 12.2 to MP 15.0 where the elevation ranges from approximately 80 feet to 120 feet.

The proposed Rehoboth Compressor Station is located approximately 100 feet above mean sea level, in an area of relatively flat terrain

Connecticut

The topography of the E-3 System pipeline route generally consists of moderately hilly terrain with elevation ranges from approximately 100 feet to 365 feet.

3.3 Surficial Geology

Surficial geology of the E2W Project area is dominated by glacial till, sand and gravel, and finer silt and clay deposits and more recent swamp and alluvium deposits. Advancing glaciers laid down a layer of till atop bedrock. Till is a dense diamict generally consisting of gravel and fine silt and clay. As glaciers melted and retreated, meltwater deposited sand and gravel (stratified drift) over till deposits. Fine sand, silt, and clay were deposited where meltwater ponded to form glacial lakes. Alluvial and swamp deposits are the most recent surficial deposits and overlie glacial sediments. Since sand and gravel and finer sediments overlie till deposits, areas where these sediments occur are not expected to require blasting of shallow bedrock. Till thickness and composition are expected to vary, and areas of till occurrence might have shallow bedrock or be too compact to excavate, requiring blasting. A

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

review of surficial geology maps provided information regarding the nature of deposits expected in the Project area.

Massachusetts

Surficial geology along the Massachusetts portions of the E2W Project consists of till, floodplain alluvium, and sand and gravel deposits, based on review of the surface geology data layer maintained by the Massachusetts Office of Geographic and Environmental Information ("MassGIS"). Surficial geology in the vicinity of the proposed Rehoboth Compressor Station is comprised of till.

Connecticut

Surficial geology along the Connecticut portions of the E2W Project is comprised of till, sand and gravel, and finer deposits. Data on the surficial geology of Connecticut portions of the Project was compiled using a geographic information system ("GIS") data layer maintained by the Connecticut Department of Environmental Protection ("CTDEP"). Thin till deposits are expected to be less than 10 to 15 feet thick and may also include areas of bedrock outcrops. Thick till deposits are expected to be greater than 10 to 15 feet thick, allowing sufficient overburden for trenching without blasting bedrock.

Table 3-1 summarizes surficial geology in the vicinity of the I-10 Extension, Q-1 System, and E-3.

TABLE 3-1

Surficial Geology of the E2W Project

Sand and Gravel (0-50' deep)	Sand and Gravel (50+' deep)	Floodplain alluvium	Till or Bedrock
I-10 Extension Surficial Deposit By Milepost a/			
0.97-1.13	0.00-0.00	0.84-0.94	0.00-0.04 b/
2.60-3.02	7.86-7.96	3.02-3.04	0.76-0.84
7.05-7.17		7.17-7.30	0.94-0.97
7.30-7.31		9.50-9.59	1.13-2.60
7.75-7.86			3.04-7.05
7.96-8.20			7.31-7.75
9.04-9.10			8.20-9.04
11.68-11.87			9.10-9.50
12.17-12.90			9.59-11.68
			11.87-12.17
Q-1 System Surficial Deposit By Milepost a/			
12.23-12.60	17.68-18.30	15.57-15.62	12.60-13.55
13.55-14.01	18.38-18.55	15.78-16.42	14.01-14.95
14.95-15.20	18.72-18.81	17.10-17.32	15.20-15.37
15.37-15.54	18.88-19.31	18.55-18.72	15.54-15.57
17.32-17.49	19.36-19.41	18.81-18.88	15.62-15.78
17.54-17.68		19.31-19.36	16.42-17.10
18.30-18.38		19.43-19.46	17.49-17.54

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

TABLE 3-1

Surficial Geology of the E2W Project

19.41-19.43		19.55-19.60	
19.46-19.55			
19.60-19.70			
Sand and Gravel	**Swamp Deposits Alluvium**	**Thick Till**	**Thin Till or Bedrock**
E-3 System Surficial Deposit By Milepost c/			
3.20- 3.33	3.33-3.42 (alluvium)	1.04-1.09	0.00-1.04
8.49-8.55	5.13-5.34		1.09-3.20
8.64-8.81	6.64-7.10		3.42-3.52 d/
9.01-9.08	8.55-8.64		3.72-5.13 d/
9.10-9.36	8.81-9.01		5.34-6.64
			7.10-8.49
			9.08-9.10
			9.36-11.01

a/ Surficial Geology Map of the proposed route compiled from data supplied by MassGIS.
b/ Milepost 0.04 to 0.76 of the I-10 Extension is the Weymouth Fore River.
c/ Surficial Geology Map of the proposed route courtesy of CTDEP GIS data layers.
d/ E-3 System, MP 3.52 to MP 3.72 is the Shetucket River.

3.4 Subsurface Geology

Massachusetts

The Massachusetts portion of the E2W Project is located in two lithotectonic subdivisions: the I-10 Extension and Q-1 System are located in the Brittlely Deformed Terrane; and the Rehoboth Compressor Station is located in the Narragansett Basin. Information on bedrock lithologies in Massachusetts were obtained from the Bedrock Geologic Map of Massachusetts. The bedrock geology is further described below.

Braintree Argillite and Weymouth Formation (Cbw) (Brittlely Deformed Terrane) – Argillite is a weakly metamorphosed mudstone or shale without the fissility of shale.

Dedham Granite (Zdgr) (Brittlely Deformed Terrane) – The Dedham Granite is a light pinkish to greenish gray granite.

Diorite (Zdi) (Brittlely Deformed Terrane) – This formation consists of a medium grained, hornblende diorite that is metamorphosed in places to amphibolite and hornblende gneiss.

Sharon Syenite (Zssy) (Brittlely Deformed Terrane) – The Sharon Syenite is a gray to dark gray syenite with micropherthite, oligoclase, and clinopyroxene mixed with ferro-gabbro.

All Rights Reserved

Rhode Island Formation (Pr) (Narragansett Basin) – The Rhode Island Formation consists of a mix of sedimentary rocks including sandstone, greywacke, shale, and conglomerate with minor meta-anthracite beds.

Connecticut

The Connecticut portion of the E2W Project (E-3 System) is located in the Iapetos Terrane of the Eastern Uplands lithotectonic subdivision. The Iapetos Terrane was created during a continental collision that was part of the formation of the supercontinent Pangaea approximately 450 to 250 million years ago. As such, the bedrock in the Iapetos Terrane is generally folded and metamorphosed. The following provides a summary of the bedrock that underlies the Project area by milepost. Information on bedrock lithologies was obtained from the Bedrock Geological Map of Connecticut. The bedrock geology is further described below.

Yantic Member of the Tatnic Hill Formation (Otay) (Iapteos Terrane) – The Yantic Member of the Tatnic Hill Formation is a gray to dark gray, fine to medium grained schist.

Fly Pond Member of the Tatnic Hill Formation (Otaf) (Iapteos Terrane) – The Fly Pond Member of the Tatnic Hill Formation is a light gray, medium grained calc-silicate gneiss.

Tatnic Hill Formation (Ota) (Iapteos Terrane) – The Tatnic Hill Formation is a gray to dark gray, medium grained gneiss or schist.

Quinnebaug Formation (Oq) (Iapetos Terrane) – The Quinnebaug Formation is a gray to dark gray, medium grained, well layered gneiss.

Preston Gabbro Diorite Phase (Opd) (Iapetos Terrane) – The diorite phase of the Preston Gabbro is a medium to dark gray, streaked, medium grained diorite.

Preston Gabbro (Op) (Iapetos Terrane) – The Preston Gabbro is a mafic, medium to coarse grained, massive igneous rock.

Table 3-2 shows where the lithotectonic subdivisions occur along the E2W Project facilities in Massachusetts and Connecticut.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

TABLE 3-2 **Subsurface Geology of the E2W Project**		
Milepost	**Geologic Symbol-Unit**	**Geologic Age**
I-10 Extension		
0-0.97	Cbw – Braintree Argillite/Weymouth Formation	Cambrian
0.97-7.91, 8.37-8.96, 12.36-12.88	Zdgr – Dedham Granite	Proterozoic
7.91-8.37, 8.96-12.36	Zdi – Diorite	Proterozoic
Q-1 System		
12.24-14.80	Zssy – Sharon Syenite	Proterozoic
14.80-16.11	Zdi – Diorite	Proterozoic
16.11-19.66	Zdgr – Dedham Granite	Proterozoic
Rehoboth Compressor Station		
	Pr – Rhode Island Formation	Pennsylvanian
E-3 System		
0.00-0.31	Otay – Yantic Member of Tatnic Hill Fmn	Ordovician
0.31-0.62	Otaf – Fly Pond Member of Tatnic Hill Fmn	Ordovician
0.62-8.6	Ota – Tatnic Hill Formation	Ordovician
8.60-9.91	Oq – Quinnebaug Formation	Ordovician
9.91-10.05	Opd – Preston Gabbro (diorite phase)	Ordovician
10.05-11.01	Op – Preston Gabbro	Ordovician

3.5 Active Faults

While there are hundreds of old fault lines in New England, seismologists have not found any correlation between the frequency of modern earthquakes and the location of these old fault lines. There were no faults identified in Massachusetts. There are a few minor faults along E-3 pipeline in Connecticut. One of the most well known faults in Connecticut is the eastern border fault which begins south of New Haven (the exact origin is under water) and extends for 130 miles north to Keene, New Hampshire. However, this fault has remained inactive for 140 million years, and the few small earthquakes that occur in Connecticut have never been found to be related to a specific fault.

3.6 Bedrock (less than five feet below the surface)

Depth to bedrock is less than 60 inches (5 feet) along approximately 2.60 miles of the I-10 Extension, 0.35 miles of the Q-1 System, and approximately 1.42 miles of the E-3 System. Table 3-3 in Appendix A indicates the mileposts where shallow bedrock occurs.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

3.7 Soil Hazards

The characteristics of the major soil types, vegetative cover, and slope are important factors in determining the potential for soil hazards. With regards to blasting, there are areas identified along the E2W Project that are prone to introduction of rocks into topsoil during excavation and backfilling. Other issues of potential soil hazards include areas along the pipeline route that are prone to severe erosion, are designated as prime farmland, hydric, prone to compaction, and soils with poor or very poor revegetation potential. Resource Report 7 provides additional information on soils. Table 3-3 in Appendix A delineates the soil hazards by milepost. Information regarding the hazards was compiled from the referenced USDA County Soil Surveys.

4.0 Pre-Blast Inspection

As required by the FERC, Algonquin shall conduct pre-blast surveys, with landowner permission, to assess the conditions of structures, wells, springs, and utilities within 150 feet of the proposed construction ROW. Should local or state ordinances require inspections in excess of 150 feet from the work, the local or state ordinances shall prevail. The survey will include:

- Informal discussions to familiarize the adjacent property owners with blasting effects and planned precautions to be taken on this project;
- Determination of the existence and location of site specific structures, utilities, septic systems and wells;
- Detailed examination, photographs, and/or video records of adjacent structures and utilities; and
- Detailed mapping and measurement of large cracks, crack patterns, and other evidence of structural distress.

The results will be summarized in a condition report that will include photographs and be completed prior to the commencement of blasting.

5.0 Monitoring of Blasting Activities

General Blasting

During blasting, Algonquin contractors will take precautions to minimize damage to adjacent areas and structures. Precautions include:

- Dissemination of blast warning signals in the area of blasting
- Backfilling with subsoil (no topsoil to be used) or blasting mats.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

- Blast warning in congested areas, in shallow water bodies, or near structures that could be damaged by fly-rock.

- Use of matting or other suitable cover, as necessary, to prevent fly-rock from damaging adjacent protected natural resources.

- posting warning signals, flags, or barricades.

- Following Federal and State procedures and regulations for safe storage, handling, loading, firing, and disposal of explosive materials.

- manning adjacent pipelines at valves for emergency response as appropriate.

Excessive vibration will be controlled by limiting the size of charges and by using charge delays, which stagger each charge in a series of explosions.

If the contractor has to blast near buildings or wells, a qualified independent contractor will inspect structures or wells within 150 feet, or farther if required by local or state regulations, of the construction right-of-way prior to blasting, and with landowner permission. Post-blast inspections by the company's representative will also be performed as warranted. All blasting will be performed by registered blasters and monitored by experienced blasting inspectors. Recording seismographs will be installed by the contractor at selected monitoring stations under the observation of Algonquin personnel. During construction, the contractor will submit blast reports for each blast and keep detailed records as described in Section 6.7.

As appropriate, effects of each discharge will be monitored at the closest adjacent facilities by seismographs.

If a charge greater than eight pounds per delay is used, the distance of monitoring will be in accordance with the U.S. Bureau of Mines Report of Investigations 8507.

To maximize its responsiveness to the concerns of affected landowners, Algonquin will evaluate all complaints of well or structural damage associated with construction activities, including blasting. A toll-free landowner hotline will be established by Algonquin for landowners to use in reporting complaints or concerns. In the unlikely event that blasting activities temporarily impair a well water, Algonquin will provide alternative sources of water or otherwise compensate the owner. If well or structural damage is substantiated, Algonquin will either compensate the owner for damages or arrange for a new well to be drilled.

Algonquin has a Spill, Prevention, Control and Countermeasure Plan ("SPCC Plan") that addresses the handling of construction fuel and other materials. The SPCC Plan provides a set of minimum requirements to be used by the contractor in developing

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

their own project-specific SPCC Plan. The SPCC Plan is included in the Algonquin's E2W Project, *Erosion and Sediment Control Plan ("E&SCP").*

6.0 Blasting Specifications

Algonquin has adopted the standard practices for blasting operations of Spectra Energy. The potential for blasting along the pipeline to affect any wetland, municipal water supply, waste disposal site, well, septic system, or spring will be minimized by controlled blasting techniques and by using mechanical methods for rock excavation as much as possible. Controlled blasting techniques have been effectively employed by Algonquin and other companies to protect active gas pipelines within 15 feet of trench excavation. The following text presents details of procedures for powder blasting, as extracted from Spectra Energy specifications and applied to Algonquin's E2W Project.

6.1 General Provisions

The contractor will provide all personnel, labor, and equipment to perform necessary blasting operations related to the work. The contractor will provide a permitted blaster possessing all permits required by the states in which blasting is required during construction, and having a working knowledge of state and local laws and regulations that pertain to explosives.

Project blasting will be done in accordance with 27 CFR Part 55, 30 CFR §715.19, National Fire Protection Association 495 - Explosive Materials Code; the above Spectra Energy Specification; 527 CMR 13.00, Connecticut General Statute 29-349 and all other state and local laws, when required; and regulations applicable to obtaining, transporting, storing, handling, blast initiation, ground motion monitoring, and disposal of explosive materials and/or blasting agents.

The contractor shall be responsible for supplying explosives and blasting materials that are perchlorate-free in order to eliminate the potential for perchlorate contamination of ground water.

The contractor shall be responsible for securing and complying with all necessary permits required for the transportation, storage, and use of explosives. The contractor shall be responsible for all damages or liabilities occurring on or off the right-of-way resulting from the use of explosives. When the use of explosives is necessary to perform the work, the contractor shall use utmost care not to endanger life or adjacent property, and shall comply with all applicable laws, rules, and regulations governing the storage, handling, and use of such explosives.

Blasting activities will strictly adhere to all local, state, and federal regulations applying to controlled blasting and blast vibration limits in regard to structures and

All Rights Reserved

underground utilities. In addition to following state and federal blasting guidelines, Algonquin will contact each municipality along the proposed route to determine local ordinances or guidelines for blasting (refer to Table 6-1).

TABLE 6-1

Contacts and Related Permitting Required Prior to Blasting Along the E2W Project

Jurisdiction	Contact	Agency	Permit/Regulation
Weymouth, Massachusetts	Robert Leary, Fire Chief 781-337-5151	Fire Department	Notification and Permit
Avon, Massachusetts	Robert Spurr, Fire Chief 508-583-5361	Fire Department	Notification and Permit
Braintree, Massachusetts	Kenneth J. McHugh, Fire Chief 781-843-3600	Fire Department	Notification and Permit
Canton, Massachusetts	Thomas J. Ronayne III, Fire Chief 781-575-6654	Fire Department	Notification and Permit
Holbrook, Massachusetts	Edward J. O'Brein, Fire Chief 781-767-2234	Fire Department	Notification and Permit
Randolph, Massachusetts	Charles D. Foley, Jr., Fire Chief 781-961-0991	Fire Department	Notification and Permit
Stoughton, Massachusetts	David M. Jardin, Fire Chief 781-344-3170, extension 202	Fire Department	Notification and Permit
Sharon, Massachusetts	Dennis F. Mann, Fire Chief 781-784-1522	Fire Department	Notification and Permit
Rehoboth, Massachusetts	Robert F. Pray, Fire Chief 508-252-3725	Fire Department	Notification and Permit
North Stonington, Connecticut	Timothy O. Main, II, Fire Chief 860-535-0937	Fire Department	Notification and Permit
Ledyard, Connecticut	Bill Waterhouse, Fire Chief 860-464-9222	Fire Department	Notification and Permit
Preston, Connecticut	Tom Casey, Fire Chief 860-887-5581 x104	Fire Department	Notification and Permit

The construction contractor will be made aware of all applicable procedures and local requirements and it will ultimately be the contractor's responsibility to notify officials and receive appropriate blasting permits and authorization.

Typically, local regulations require copies of the blasting contractor's certificate of insurance and license. In some jurisdictions, a certificate of bond will also be required, as well as a qualified person hired to oversee the blasting procedure.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

The Chief Inspector ("CI") or designated representative shall have the opportunity to witness all rock excavations or other use of explosives. The contractor shall conduct all blasting operations in a safe manner which will not cause harm to the existing pipelines and structures in the vicinity. If the CI determines that any project blasting operation have been conducted in an unsafe manner, the CI will notifiy the Contractor of the unsafe activity. If any further unsafe actions occur on the part of the blasting firm, the CI will request that the Contractor terminate the contract of the blasting firm and hire another blasting company.

Any failure to comply with the appropriate law and/or regulations is the sole liability of the contractor. The contractor and the contractor's permitted blaster shall be responsible for the conduct of all blasting operations, which shall be subject to inspection requirements.

A blasting fact sheet will be distributed to landowners where blasting is proposed, and affected landowners will be contacted prior to any blasting activities.

6.2 Storage Use at Sites

Explosives and related materials shall be stored in approved facilities required under the applicable provisions contained in 27 CFR Part 55, Commerce in Explosives. The handling of explosives may be performed by the person holding a permit to use explosives or by other employees under his or her direct supervision provided that such employees are at least 21 years of age. While explosives are being handled or used, smoking shall not be permitted, and no one near the explosives shall possess matches, open light or other fire or flame within 50 feet of the explosives, in accordance with OSHA requirements. Suitable devices for lighting safety fuses are exempt from this requirement. No person shall handle explosives while under the influence of intoxicating liquors or narcotics at any time during construction of the Project. Original containers or Class II magazines shall be used for taking detonators and other explosives from storage magazines to the blasting area. Partial reels of detonating cord do not need to be in closed containers unless transported over public highways. Containers of explosives shall not be opened in any magazine or within 50 feet of any magazine. In opening kegs, or wooden cases, no sparking metal tools shall be used; wooden wedges and either wood, fiber or rubber mallets shall be used. Non-sparking metallic slitters may be used for opening fiberboard cases.

No explosive materials shall be located or stored where they may be exposed to flame, excessive heat, sparks, or impact.

Explosives or blasting equipment that are obviously deteriorated or damaged shall not be used. Explosive materials shall be protected from unauthorized possession and shall not be abandoned.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

No attempt shall be made to fight a fire if it is determined that the fire cannot be contained or controlled before it reaches explosive materials. In such cases, all personnel shall be immediately evacuated to a safe location and the area shall be guarded from entry by spectators or intruders.

No firearms shall be discharged into or in the vicinity of a vehicle containing explosive materials or into or in the vicinity of a location where explosive materials are being handled, used, or stored.

6.3 Pre-Blast Operations

The contractor is required to submit a planned schedule of blasting operations to the CI or his designated representative for approval, prior to commencement of any blasting or pre-blast operation, which indicates the maximum charge weight per delay, hole size, spacing, depth, and blast layout. If blasting is to be conducted adjacent to an existing Algonquin pipeline, approval must be received from the Algonquin Transmission department. The contractor shall provide this schedule to the CI at least five working days prior to any pre-blast operation for approval and use. Where residences are within 50 feet of the blasting operation the CI may require notification in excess of five days. The blasting schedule is to include the blast geometry, drill hole dimensions, type and size of charges, stemming, and delay patterns and should also include a location survey of any dwelling or structures that may be affected by the proposed operation. Face material shall be carefully examined before drilling to determine the possible presence of unfired explosive material. Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges, and if any are found, they shall be re-fired before work proceeds. No person shall be allowed to deepen the drill holes that have contained explosives.

Drill holes shall be large enough to permit free insertion of cartridges of explosive materials. Drill holes shall not be collared in bootlegs or in holes that have previously contained explosive materials. Holes shall not be drilled where there is a danger of intersecting another hole containing explosive material. Charge loading shall be spread throughout the depth of the drill hole or at the depths or rock concentration in order to obtain the optimum breakage of rock.

Loading and firing shall be performed or supervised only by a person possessing an appropriate blasting permit. All drill holes shall be inspected and cleared of any obstruction before loading. No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives shall be immediately returned to an authorized magazine.

A maximum loading factor of 3½ pounds of explosive per cubic yard of rock shall not be exceeded. However, should this loading fail to effectively break up the rock, a

All Rights Reserved

higher loading factor shall be allowed if the charge weight per delay is reduced by a proportional amount and approved by the CI.

Each borehole shall be primed with detonating cord thus eliminating blasting caps in boreholes for trench blasting. Detonating cord should be limited to 25 grains to prevent blowing stemming out of the drill hole. Boreholes shall be delayed in pairs with a minimum of 17 milliseconds ("ms"); 25 ms delays may be used with prior approval of the CI. Slightly longer delays may be used over steep hills with prior approval of the CI. Primers shall not be assembled closer than 50 feet (15.25 m) from any magazine. Primers shall be made up only when and as required for immediate needs.

Tamping shall be done only with wood rods without exposed metal parts, but non-sparking metal connectors may be used for jointed poles. Plastic tamping poles may be used, provided the authority having jurisdiction has approved them. Violent tamping shall be avoided.

Recommended stemming material shall consist of crushed stone with d_{50} = 3/8 inch, which will not bridge over like dirt and will completely fill voids in the hole.

When safety fuse is used, the burning rate shall be determined and in no case shall fuse lengths less than 120 seconds be used. The blasting cap shall be securely attached to the safety fuse with a standard ring type cap crimper.

Pneumatic loading of blasting agents in blast holes primed with electric blasting caps or other static-sensitive initiation systems shall comply with the following requirements:

- A positive grounding device shall be used for the equipment to prevent accumulation of static electricity;
- A semi-conductive discharge hose shall be used; and
- A qualified person shall evaluate all systems to assure that they will adequately dissipate static charges under field conditions.

No blasting caps or other detonators shall be inserted in the explosives without first making a hole in the cartridge for the cap with a wooden punch of proper size or standard cap crimper.

After loading for a blast is completed, all excess blasting caps or electric blasting caps and other explosives shall immediately be removed from the area and returned to their separate storage magazines.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

6.4 Discharging Explosives

Persons authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution, including, but not limited to, warning signals, flags, barricades, or woven wire mats to ensure the safety of the general public and workmen.

The contractor shall obtain Algonquin's approval and provide them at least 24-hour notice prior to the use of any explosives. The contractor shall comply with local and state requirements for pre-blast notifications, such as "Dig-Safe", which requires a 72 hour notice.

Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph and steam utilities, the blaster shall notify the appropriate representatives of such utilities at least 24 hours in advance of blasting. Verbal notice shall be confirmed with written notice. In an emergency, the local authority issuing the original permit may waive this time limit.

Blasting operations, except by special permission of the authority having jurisdiction, shall be conducted during daylight hours.

When blasting is done in congested areas or in proximity to a significant natural resource, structure, railway, or highway or any other installation that may be damaged, the blast shall be backfilled before firing or covered with a mat, constructed so that it is capable of preventing fragments from being thrown. In addition, all other possible precautions shall be taken to prevent damage to livestock and other property and inconvenience to the property owner or tenant during blasting operation. Any rock scattered outside the right-of-way by blasting operations shall immediately be hauled off or returned to the right-of-way.

Cap and fuse shall not be used to initiate blasts in congested areas or adjacent to highways open to traffic.

Precautions shall be taken to prevent accidental discharge of electric blasting caps from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous electricity. These precautions shall include:

- Suspension of all blasting operations and removal of all personnel from the blasting area during the approach and progress of an electrical storm;
- The posting of all signs warning against the use of mobile radio transmitters on all roads within 350 feet (107 m) of blasting operations; and

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

- Observance of the latest recommendations with regard to blasting in the vicinity of radio transmitters or power lines, as set forth in the IME Safety Library Publication No. 20, Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps.

Only electric blasting caps shall be used for blasting operations in congested districts, or on highways, or adjacent to highways open to traffic, except where sources of extraneous electricity make such use dangerous.

When electric blasting caps are used, stray current tests shall be made as frequently as necessary. Maximum stray current shall not exceed 0.05 amperes through a 1-ohm resistor, measured at the location of the blasting cap. Non-electric initiating systems shall be used if extraneous currents exceed this limit. Electric detonators of different brands shall not be used in the same firing circuit. Blasters, when testing circuits to charged holes, shall use only blast galvanometers designed for this purpose.

No blast shall be fired until the blaster in charge has made certain that all surplus explosive materials are in a safe place, all persons and equipment are at a safe distance or under sufficient cover, and that an adequate warning signal has been given.

Only the person making leading wire connections in electrical firing shall fire the shot. All connections should be made from the bore hole back to the source of firing current, and the leading wires shall remain shorted until the charge is to be fired. After firing an electric blast from a blasting machine, the leading wires shall be immediately disconnected from the machine and short-circuited. If there are any misfires while using cap and fuse, all persons shall remain away from the charge for at least one hour. If electrical blasting caps are used and a misfire occurs, this waiting period may be reduced to 30 minutes. Misfires shall be handled under the direction of the person in charge of the blasting and all wires shall be carefully traced in search for the unexploded charges.

Explosives shall not be extracted from a hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

6.5 Waterbody Crossing Blasting Procedures

To facilitate planning for blasting activities for waterbody crossings, rock drills or test excavations may be used in waterbodies to test the ditch-line during mainline blasting operations to evaluate the presence of rock in the trench-line. The excavation of the test pit or rock drilling is not included in the time window requirements for completing the crossing. For testing and any subsequent blasting operations, streamflow will be maintained through the site. When blasting is

All Rights Reserved

required, the FERC timeframes for completing in-stream construction begin when the removal of blast rock from the waterbody is started. If, after removing the blast rock, additional blasting is required, a new timing window will be determined in consultation with the Environmental Inspector. If blasting impedes the flow of the waterbody, the contractor can use a backhoe to restore the stream flow without triggering the timing window. The complete waterbody crossing procedures are included in the Algonquin's E&SCP.

6.6 Disposal of Explosive Materials

All explosive materials that are obviously deteriorated or damaged shall not be used and shall be destroyed according to applicable local, state, and federal requirements.

Empty containers and packages and paper on fiberboard packing materials that have previously contained explosive materials shall not be reused for any purpose. Such packaging materials shall be destroyed by burning at an approved outdoor location or by other approved method. All personnel shall remain at a safe distance from the disposal area.

All other explosive materials will be transported from the job site in approved magazines per local and/or state regulations.

6.7 Blasting Records

A record of each blast shall be made and submitted, along with seismograph reports, to the Algonquin blasting inspector. The record shall contain the following minimum data for each blast:

- Name of company or contractor;
- Location, date and time of blast;
- Name, signature and license number of contractor and of blaster in charge;
- Type of material blasted;
- Number of holes, depth of burden and stemming, and spacing;
- Diameter and depth of holes;
- Volume of rock in shot;
- Types of explosives used, specific gravity, energy release, pounds of explosive per delay, and total pounds of explosive per shot;
- Delay type, interval, total number of delays and holes per delay;

All Rights Reserved

- Maximum amount of explosives per delay period of 17 milliseconds or greater;
- Power factor;
- Method of firing and type of circuit;
- Direction and distance in feet to nearest structure and utility neither owned or leased by the person conducting the blasting;
- Weather conditions;
- Type and height or length of stemming;
- If mats or other protection were used; and
- Type of detonators used and delay periods used.

The person taking the seismograph reading shall accurately indicate exact location of the seismograph if used, and shall also show the distance of the seismograph from the blast.

Seismograph records, where required, should include:

- Name of person and firm operating and analyzing the seismograph record;
- Seismograph serial number;
- Seismograph reading;
- Maximum number of holes per delay period of 17 milliseconds or greater.

7.0 Post-Blast Inspection

An independent contractor, with landowner permission, will examine the condition of structures within 150 feet, or as required by state or local ordinances, of the construction area after completion of blasting operations to identify any changes in the conditions of these properties or confirm any damages noted by the landowner. The independent contractor with landowner approval will conduct a resampling of wells within 150 feet, or as required by state or local ordinances, of the construction area. Should any damage or change occur during the blasting operations, an additional survey of the affected property may be made.

All Rights Reserved

APPENDIX A

SOILS CROSSED BY THE E2W PIPELINE FACILITIES

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved

The attached table is too voluminous to include in this EIS but can be viewed on the FERC Internet website at http://www.ferc.gov. Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., CP08-420). Select a date range of June 1, 2008 to July 1, 2008.

Copyright, 2008, Algonquin Gas Transmission, LLC
All Rights Reserved