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August 14, 2014 Reference No. 059556-04

Mr. Peter Geddes
Director, Policy and Planning
Nova Scotia Environment
PO Box 442
Halifax, Nova Scotia B3J 2P8

Mr. Geddes

Re: Pioneer Coal's Request to Blast at the Stellarton Surface Coal Mine, Pictou County

In response to your letter dated March 19, 2014 to Pioneer Coal Limited (Pioneer Coal), we are pleased to provide you with a response to your request for more information regarding the planned Amendment to the Environmental Assessment Approval for the above noted project.

Throughout the project, mechanical means have been strictly used to extract the overburden and coal. However, an approximately 10 m (33 ft) thick, dipping band of cap rock has been encountered which requires the application of explosives (blasting) to remove it.

Our response is laid out in the same order as requested in your letter. A general introduction and/or discussion are given in this letter. Detailed information is provided in attached figures and appendices as indicated.

Blast Frequency and Design

It is intended that one blast will occur once a week for the remaining duration of the mining project. This question was directed to the public for input, who indicated a preference that the blast should be regularly scheduled, *e.g.* Monday at 4 pm, with a scheduled alternate day (*e.g.* Thursday) and if the blast does not occur at the specified time it should not occur until the next week at the specified time.

Explotech Engineering Ltd. (Explotech), an independent, globally-recognized, blasting expert, was engaged to perform a Blast Feasibility Analysis for the project. The analysis included vibration and overpressure calculations based on the four following scenarios and the summary below.

- 6.5" hole, 5" cartridge explosive, no surface collar, 118 kg/delay, 12'x12' pattern
- 6.5" hole, 5" cartridge explosive, 2m surface collar, 92 kg/delay, 11'x11' pattern
- Pioneer Coal's 2 deck design
- Pioneer Coal's 3 deck design

"In all cases, ground vibrations will not be an issue. Overpressure might be an issue in option 1, however, it is important to note that this scenario would never happen without overburden in place (i.e. you would not have a zero collar when the rock is right to the surface). As such, we ran the second scenario which would be more reasonable for rock to the surface. Also keep in mind that the overpressure equations are always super conservative since there is so much variability in it."

"All of the options will work; however, with the decking, it is overkill as far as limiting the overpressure and vibrations and Pioneer will run the risk of having to work much harder to excavate the rock."

Explotech further comments that "it is anticipated that some adjustments of design will be necessary based on observed blast performance. The initial blasts shall be more closely scrutinized in order to permit timely adjustments as required. Given that blasting will take place below grade within the already existing open pit, it is anticipated that the actual ground vibrations and overpressures will reside well below the calculated values."

Pioneer Coal intends to use a 3 deck blast design. The results of the analysis of this approach are provided in Attachment 1.

Scaled Site Plan

A scaled site plan showing the area to be subjected to blasting, surrounding on and off site structures, including power lines, adjacent water courses and wetlands is shown attached as Figure 1. A typical vertical profile of the area to be blasted indicted the cap rock and coal seam is attached as Figure 2.

Adverse Effects

Explotech Engineering Ltd. described the anticipated adverse effects that may result from the blasting activities and the steps proposed to reduce or mitigate impacts. A summary is provided below.

"Lands immediately surrounding the areas requiring blasting are largely characterized by vacant forested areas, farm fields and other areas of the coal extraction operation undergoing mechanical excavation. Further removed, the closest structures to the blasting are" (*i.e.* Foster Avenue) more than 400 m from the proposed mine site blasting area.

"The detonation of explosives results in the development of very high gas and shock pressures. This energy is transmitted to the surrounding rock, crushing the rock immediately surrounding

the borehole (approximately 1 borehole radius) and permanently distorts the rock to several borehole diameters (5-25, depending on the rock type, prevalence of joint sets, etc).

"The intensity of this stress wave decays quickly so that there is no further permanent deformation of the surrounding rock mass. The remaining energy from the detonation travels through the unbroken material in the form of a pressure wave or shock front which, although it causes no plastic deformation of the rock mass, is transmitted in the form of vibrations.

"Recent years have seen an almost universal adoption of blast vibration control standards developed by the United States Bureau of Mines (USBM). The USBM conducted extensive scientific research on the effects of blasting vibrations on DRAFT structures, using some of the most respected scientists and engineers in the field. Their report (Report of Investigation 8507) was issued in the early 1980's and established baselines for measuring, analyzing and mitigating blast induced vibrations and their risks and effects. Research has been conducted by countless organizations in the years since the release of RI8507 and has confirmed the authenticity and conservatism of the original report findings. Accordingly, these standards have been utilized as the basis for the development of blast and vibration control regulations by the overwhelming majority of Government and private organizations across North America.

"Particle velocity is the descriptor of choice when dealing with vibrations because of its superior correlation with the appearance of cosmetic cracking. While particle velocities provide one measurement statistic, structural responses to varied frequency necessitates the inclusion of frequency analysis in all vibration measurement. As such, the USBM criteria developed utilizes a graded scale incorporating reduced permissible particle velocities at reduced dominant frequencies. This is not to say that damage automatically occurs once these levels are breached and, in fact, threshold damage would not occur in the weakest component (i.e. plaster walls) of the average residence until ground vibrations reached significantly higher intensities. We further note that damage of any kind as a result of blast induced vibrations has not been observed below the so-called USBM 'ZCurve' threshold limits. As such, provided the USBM limits are adhered to, damage as a result of blast induced vibrations is rendered effectively impossible.

"It is an intrinsic nature of blast induced vibrations that these vibrations decrease with increasing distance. Under typical conditions, the vibration intensity decreases by two thirds of its previous value for every doubling of distance. That is to say that a peak particle velocity measurement of 100mm/s at a distance of 100 m from the blast location will have decreased to 33.3mm/s at a separation distance of 200m and 11.1 mm/s at a separation distance of 400m. While the nature of the transmitting medium (rock, earth, water) and presence of joint sets, fractures, faults and shear zones will all impact the rate of decay of the ground vibrations, the

fact that intensities diminish with distance within consistent media is unavoidable. As such, the vibration criteria can be readily extrapolated to elements falling further from the blast site than the monitoring location.

"In terms of air overpressures, overpressures in the 140dB range are considered by most experts in the field to be the threshold level at which damage to windows could possibly begin to occur and at which long term exposure to persons can become of concern. This level is approximately equivalent to a wind gust of 65km/hr.

"Quarry and Mining operations in the Province of Nova Scotia are generally governed by the [Nova Scotia Department of Labour and Advanced Education]. The guidelines for blasting in mines and quarries are among the most stringent in North America. Exhaustive studies by the U.S. Bureau of Mines have shown that normal temperature and humidity changes cause more damage to residences than blast vibrations and overpressure in the ranges suggested as appropriate limits by the [Province of Nova Scotia]."

"Flyrock is the term used to define rocks which are propelled from the blast area by the force of the explosion. This action is a predictable and necessary component of a blast and requires that every blast have an exclusion zone established within which no persons or property which may be harmed are permitted.

"Flyrock occurs when explosives in a hole are poorly confined by the stemming or rock mass and the high pressure gas breaks out of confinement and launches rock fragments into the air. The three primary sources of fly rock are as follows:

- **Face burst:** Lack of confinement by the rock mass in front of the blast hole results in fly rock in front of the face.
- **Cratering:** Insufficient stemming height or weakened collar rock results in a crater being formed around the hole collar with rock projected in any direction.
- **Stemming Ejection:** Poor stemming practice can result in a high angle throw of the stemming material and loose rocks in the blast hole wall and collar."

A series of calculations is used to determine the maximum fly rock thrown from a blast. Assuming no overburden in place and using a 3 m collar length, the maximums flyrock throws are: Face burst – 59 m; Cratering –147 m; Stemming ejection – 0 m. Longer collar lengths only reduce cratering effect with no change in the other parameters.

Blasting is a regulated activity that can be done safely using engineered methods in urban environments with little effect to surrounding buildings. A case in point is recent activity in

downtown Halifax, where blasting at the new Nova Centre complex has been done to excavate for the buildings foundations. An aerial view (Attachment 2) shows the proximity of infrastructure to that site.

Pre-Blast Surveys or Vibration Monitoring

Explotech Engineering Ltd. provided rationale for not conducting pre-blast surveys (Attachment 1). Essentially, pre-blast surveys only provide a snapshot in time and "with no formal protocol to revisit the surveys or account for new construction, the value of any inspection quickly dissipates. Every structure will experience cracking and dislocation over its lifetime in response to a variety of environmental and physical influences. Pre-blast inspections are often performed as a means of alleviating concerns expressed by homeowners in close proximity to blasting operations and to provide a baseline for assessing and evaluating complaints of damage following the completing of operations. These inspections are designed to provide a representative sampling of pre-existing deficiencies and are not intended to be an exhaustive detaining of all defects contained within the inspected property."

"In addition to pre-blast inspections, properly executed blasting operations will include a vibration monitoring program [described below]. These programs are designed to measure vibrations generated as a result of the blasting operations to ensure compliance with contract and industry standards and alleviate any risk of damage to surrounding structures. In the event of any complaints of possible damage, the vibration monitoring reports, along with any available pre-blast inspection documentation, form an integral part in assessing and investigating purported damage."

"Quarry and mining operations in most of Canada do not have specific requirements for pre-blast inspections and, in fact, the application of pre-blast inspections are generally not recommended in such applications. The rationale behind this practice is due to the long term operational nature of mines and quarries and focus on blast monitoring to outline impacts. The average residential home will develop one new crack every two weeks in response to a variety of forces including those listed above regardless of the imposition of blast vibrations. It is largely impossible to distinguish these environmentally induced cracks from those induced by vibration sources. For construction projects, blasting operations typically last a matter of weeks or months such that the time delay between pre-blast and post-blast conditions is relatively short. This permits an accurate assessment of new cracks and the timing of their appearance. For quarry and mining operations, blasting typically spans several years and more often decades. Given the advanced time periods for deficiency generation and the multitude of sources for their generation, the pre-blast documentation provides far less insight into the time and source of the deficiency. As such, in such applications, it is more common to rely on the

science associated with vibration monitoring in order to ascertain whether the blast vibrations represent a scientifically credible source of a deficiency."

Pioneer coal has developed a Dispute Arbitration Process and Policy that grants certain rights and imposes certain obligations upon Pioneer Coal with respect to the surface mine operation. The policy is available to any property owner who is directly affected by any environmental degradation caused by the Mine Operation, which results in personal injury, loss of use or enjoyment of property, loss of income or other consequential pecuniary loss. For purposes of the remedies available under this Policy, environmental degradation shall include:

- Reduction or loss of residential quality;
- Excessive air quality degradation; and
- Excessive noise.

The policy was approved by NS Environment as part of the Industrial Approval application and can be further extended to apply to any damage caused by blasting from the site.

Explotech provided further details and rationale for vibration monitoring.

"Given that blasting operations have not been undertaken in the past on this property, site-specific blast monitoring data are not available. We have therefore applied data generated from a variety of research studies and similar blasting operations which present a variety of material characteristics. It has been our experience that this data represents a conservative starting point for blasting operations. It is a recommendation … that a vibration and overpressure monitoring program be initiated on-site upon the commencement of blasting operations to permit timely adjustment to blast parameters as required."

"It is a requirement of the Nova Scotia guidelines and a recommendation of Explotech that all blasts be monitored for compliance within limits to quantify and record ground vibration [12.5 mm/s Peak Particle Velocity (PPV)] and overpressure [128 dB(L) Peak Sound Pressure Level (PSPL)] levels employing a minimum of two digital seismographs, one installed at the closest structure behind the blast, or closer, and one installed at the closest structure in front of the blast, or closer.

"We are also aware of power transmission lines and towers as close as 185m removed from the areas of required blasting. These elements are not vibration sensitive by nature and wind induced vibrations would routinely exceed those anticipated from the blasting operations. Potential impacts from flyrock will not present a risk concern."

"As site specific blast performance and vibration and overpressure data becomes available, it will be possible to refine these parameters on an on-going basis. The vibration and overpressure monitoring program shall be assessed on an ongoing basis as blasting proceeds."

Public Consultation

A public consultation session was held on April 30, 2014 at the Museum of Industry in Stellarton to present the plans for blasting at the mine. Details of the Public Consultation program are provided in Attachment 3.

The Community Liaison Committee met on April 21, 2014 to discuss the amendments to the project. No issues other than those already raised at the public information session were brought forward.

Closing

We trust that this information meets with your requirements to assess an amendment to approvals. This document can be made available to public interests by sending an email request to novaconstruction@ns.sympatico.ca. If you require any further information please feel free to contact the undersigned at your earliest convenience.

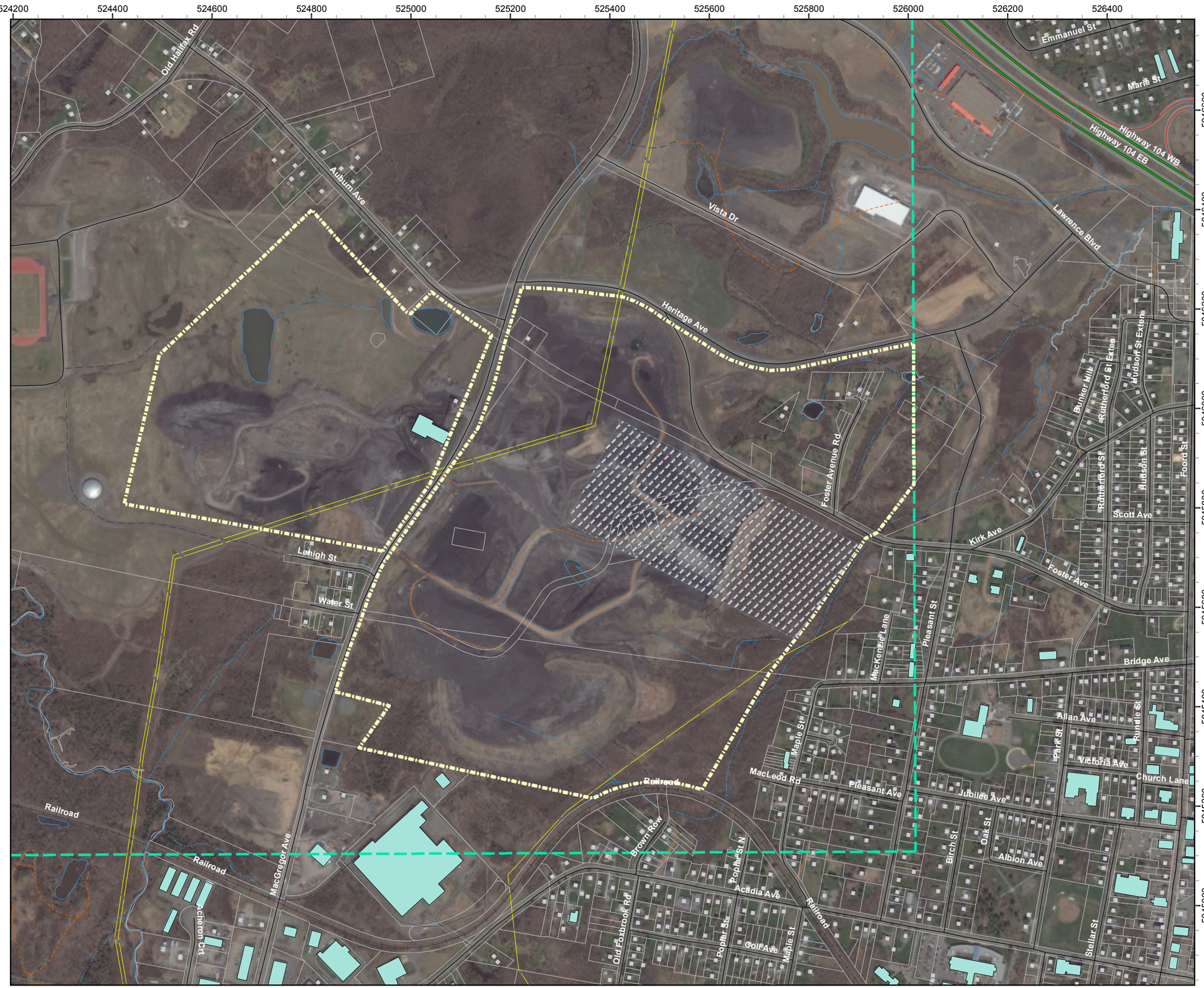
Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Peter Oram, P.Geo.

JP/ms/1
Encl.

cc: Paul White, P.Eng., Pioneer Coal



LEGEND:

- Area Requiring Modified Extraction Methods
- Active Mine Area
- Mining Lease
- Property
- Buildings
- Buildings
- Streams
- Intermittent Streams
- Transmission Line

SOURCE:

Base Map : SNS&MR
Property :
Geology :

0 50 100 200 300
Metres

N

PROJECTION:	DRAWN / CHECKED BY:	MAP ANGLE:
UTM z20 NAD83	JJP / PGO	0° North
SCALE:	**DATE:**	**PROJECT NO:**
1:7,500	AUGUST 8/2014	059556-04

059566-04 GIS-DA-001

figure 1
Project Location
STELLARTON SURFACE COAL MINE
PIONEER COAL LIMITED
Stellarton, Nova Scotia

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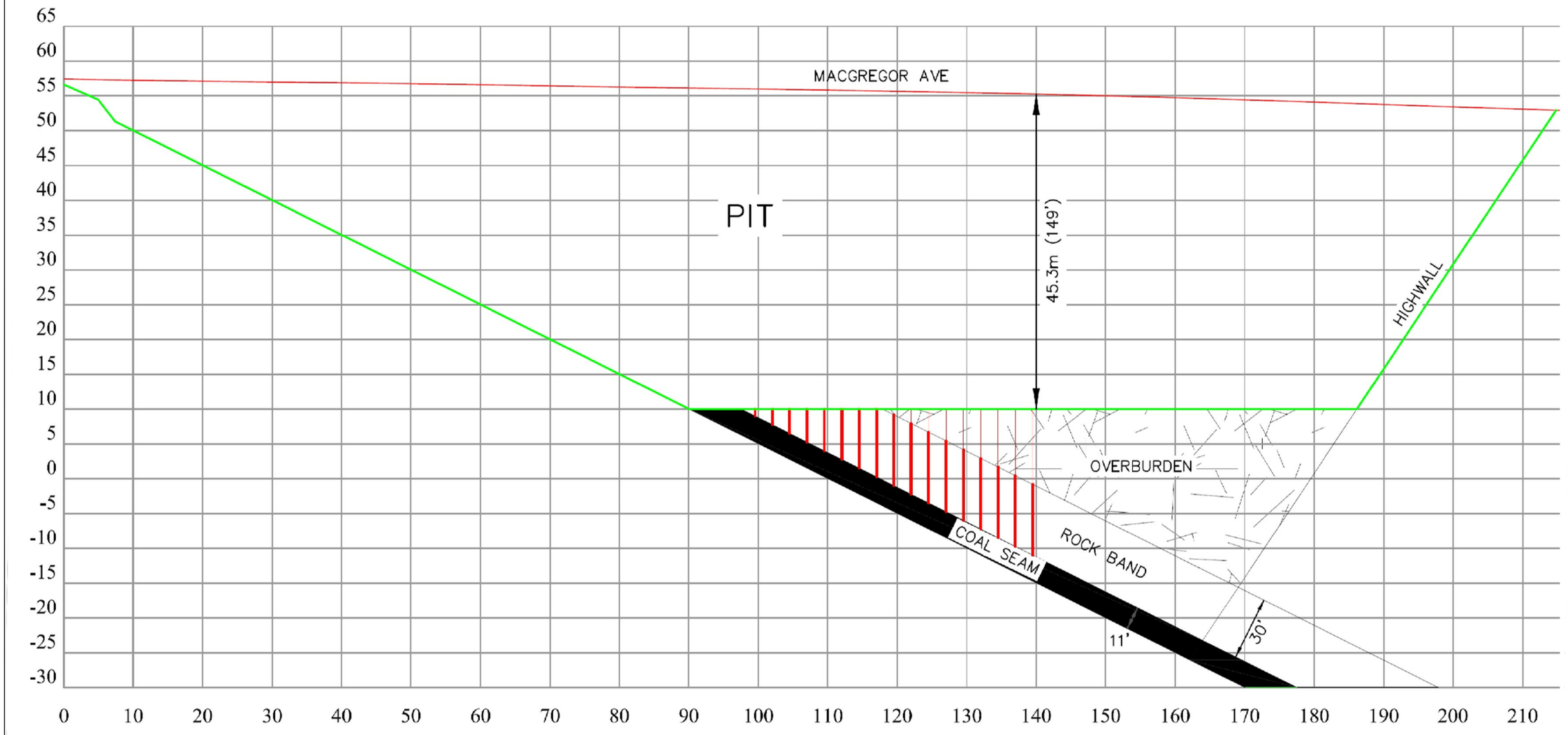


figure 2

TYPICAL LAYOUT FOR DRILL/BLAST
STELLARTON SURFACE COAL MINE
PIONEER COAL LIMITED
Stellarton, Nova Scotia

Attachment 1

Blast Feasibility Analysis – Overpressure and Ground Vibration Summary
Commentary on Pre-Blast Inspections

		Maximum Overpressure (dBL) based on full 9m loaded column using 5” cartridge, no collar – max load per hole/delay 118Kg (260 lbs)									
Separation Distance (m)	Maximum Load Per Deal	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9	EQ 10
400	118	**130.0**	**128.3**	**119.9**	**99.9**	**102.0**	**121.9**	**128.5**	**130.1**	**130.1**	**132.7**
450	118	**129.2**	**127.3**	**118.7**	**98.7**	**101.1**	**121.4**	**127.5**	**129.5**	**129.4**	**131.1**
500	118	**128.6**	**126.4**	**117.7**	**97.7**	**100.2**	**120.9**	**126.6**	**128.8**	**128.8**	**129.7**
550	118	**128.0**	**125.6**	**116.8**	**96.8**	**99.4**	**120.5**	**125.8**	**128.3**	**128.2**	**128.5**
600	118	**127.5**	**124.9**	**116.0**	**96.0**	**98.7**	**120.1**	**125.1**	**127.8**	**127.7**	**127.4**
650	118	**127.0**	**124.2**	**115.2**	**95.2**	**98.0**	**119.7**	**124.4**	**127.3**	**127.2**	**126.4**
700	118	**126.5**	**123.6**	**114.5**	**94.5**	**97.4**	**119.4**	**123.8**	**126.9**	**126.8**	**125.4**
750	118	**126.1**	**123.0**	**113.9**	**93.9**	**96.8**	**119.1**	**123.2**	**126.5**	**126.4**	**124.6**
800	118	**125.7**	**122.4**	**113.2**	**93.2**	**96.3**	**118.8**	**122.6**	**126.1**	**126.0**	**123.8**
850	118	**125.3**	**121.9**	**112.7**	**92.7**	**95.8**	**118.5**	**122.1**	**125.8**	**125.7**	**123.0**
900	118	**125.0**	**121.5**	**112.1**	**92.1**	**95.3**	**118.3**	**121.7**	**125.4**	**125.4**	**122.3**
950	118	**124.6**	**121.0**	**111.6**	**91.6**	**94.8**	**118.0**	**121.2**	**125.1**	**125.1**	**121.7**
1000	118	**124.3**	**120.6**	**111.1**	**91.1**	**94.4**	**117.8**	**120.8**	**124.8**	**124.8**	**121.0**
1100	118	**123.7**	**119.8**	**110.2**	**90.2**	**93.6**	**117.4**	**120.0**	**124.3**	**124.2**	**119.9**

		Maximum Calculated Ground Vibration (mm/s) based on 9m hole loaded full column, no collar 118kg (260 lbs)								
Separation Distance (m)	Maximum Load per delay (Kg)	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9
400	118	**3.6**	**5.4**	**3.1**	**4.6**	**0.0**	**3.6**	**9.1**	**8.9**	**9.1**
450	118	**3.0**	**4.5**	**2.6**	**3.9**	**0.0**	**2.9**	**7.8**	**7.2**	**7.4**
500	118	**2.5**	**3.8**	**2.3**	**3.3**	**0.0**	**2.5**	**6.7**	**5.9**	**6.1**
550	118	**2.1**	**3.2**	**2.0**	**2.9**	**0.0**	**2.1**	**5.9**	**4.9**	**5.2**
600	118	**1.9**	**2.8**	**1.8**	**2.5**	**0.0**	**1.9**	**5.2**	**4.2**	**4.4**
650	118	**1.6**	**2.5**	**1.6**	**2.2**	**0.0**	**1.6**	**4.7**	**3.6**	**3.9**
700	118	**1.5**	**2.2**	**1.4**	**2.0**	**0.0**	**1.5**	**4.2**	**3.2**	**3.4**
750	118	**1.3**	**2.0**	**1.3**	**1.8**	**0.0**	**1.3**	**3.8**	**2.8**	**3.0**
800	118	**1.2**	**1.8**	**1.2**	**1.6**	**0.0**	**1.2**	**3.5**	**2.5**	**2.7**
850	118	**1.1**	**1.6**	**1.1**	**1.5**	**0.0**	**1.1**	**3.2**	**2.2**	**2.4**
900	118	**1.0**	**1.5**	**1.0**	**1.4**	**0.0**	**1.0**	**3.0**	**2.0**	**2.2**
950	118	**0.9**	**1.4**	**0.9**	**1.3**	**0.0**	**0.9**	**2.8**	**1.8**	**2.0**
1000	118	**0.8**	**1.2**	**0.9**	**1.2**	**0.0**	**0.8**	**2.6**	**1.6**	**1.8**
1100	118	**0.7**	**1.1**	**0.8**	**1.0**	**0.0**	**0.7**	**2.3**	**1.4**	**1.5**

		Maximum Overpressure (dBL) based on 9m hole, 2m surface collar, 92 Kg / delay									
Separation Distance (m)	Maximum Load Per Deal	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9	EQ 10
400	92	**129.5**	**127.6**	**119.1**	**99.1**	**101.4**	**121.5**	**127.8**	**129.7**	**129.6**	**131.6**
450	92	**128.7**	**126.6**	**117.9**	**97.9**	**100.4**	**121.0**	**126.8**	**129.0**	**128.9**	**130.0**
500	92	**128.1**	**125.7**	**116.9**	**96.9**	**99.5**	**120.5**	**125.9**	**128.4**	**128.3**	**128.7**
550	92	**127.5**	**124.9**	**116.0**	**96.0**	**98.7**	**120.1**	**125.1**	**127.8**	**127.7**	**127.4**
600	92	**127.0**	**124.2**	**115.2**	**95.2**	**98.0**	**119.7**	**124.4**	**127.3**	**127.2**	**126.3**
650	92	**126.5**	**123.5**	**114.4**	**94.4**	**97.3**	**119.3**	**123.7**	**126.8**	**126.8**	**125.3**
700	92	**126.0**	**122.9**	**113.7**	**93.7**	**96.7**	**119.0**	**123.1**	**126.4**	**126.3**	**124.4**
750	92	**125.6**	**122.3**	**113.1**	**93.1**	**96.1**	**118.7**	**122.5**	**126.0**	**125.9**	**123.5**
800	92	**125.2**	**121.8**	**112.4**	**92.4**	**95.6**	**118.4**	**121.9**	**125.6**	**125.6**	**122.7**
850	92	**124.8**	**121.2**	**111.9**	**91.9**	**95.1**	**118.1**	**121.4**	**125.3**	**125.2**	**122.0**
900	92	**124.5**	**120.8**	**111.3**	**91.3**	**94.6**	**117.9**	**121.0**	**125.0**	**124.9**	**121.3**
950	92	**124.1**	**120.3**	**110.8**	**90.8**	**94.1**	**117.6**	**120.5**	**124.6**	**124.6**	**120.7**
1000	92	**123.8**	**119.9**	**110.3**	**90.3**	**93.7**	**117.4**	**120.1**	**124.3**	**124.3**	**120.0**
1100	92	**123.2**	**119.1**	**109.4**	**89.4**	**92.9**	**117.0**	**119.3**	**123.8**	**123.8**	**118.9**

		Maximum Calculated Ground Vibration (mm/s) based on a 9m hole, 2m surface collar 92kg / delay								
Separation Distance (m)	Maximum Load per delay (Kg)	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9
400	92	**2.9**	**4.4**	**2.6**	**3.8**	**0.0**	**2.9**	**7.7**	**7.1**	**7.3**
450	92	**2.4**	**3.7**	**2.2**	**3.2**	**0.0**	**2.4**	**6.5**	**5.7**	**5.9**
500	92	**2.0**	**3.1**	**1.9**	**2.7**	**0.0**	**2.0**	**5.7**	**4.7**	**4.9**
550	92	**1.8**	**2.7**	**1.7**	**2.4**	**0.0**	**1.8**	**5.0**	**3.9**	**4.2**
600	92	**1.5**	**2.3**	**1.5**	**2.1**	**0.0**	**1.5**	**4.4**	**3.3**	**3.6**
650	92	**1.3**	**2.0**	**1.3**	**1.8**	**0.0**	**1.3**	**3.9**	**2.9**	**3.1**
700	92	**1.2**	**1.8**	**1.2**	**1.6**	**0.0**	**1.2**	**3.6**	**2.5**	**2.7**
750	92	**1.1**	**1.6**	**1.1**	**1.5**	**0.0**	**1.1**	**3.2**	**2.2**	**2.4**
800	92	**1.0**	**1.5**	**1.0**	**1.4**	**0.0**	**1.0**	**3.0**	**2.0**	**2.2**
850	92	**0.9**	**1.3**	**0.9**	**1.2**	**0.0**	**0.9**	**2.7**	**1.8**	**1.9**
900	92	**0.8**	**1.2**	**0.8**	**1.1**	**0.0**	**0.8**	**2.5**	**1.6**	**1.7**
950	92	**0.7**	**1.1**	**0.8**	**1.0**	**0.0**	**0.7**	**2.3**	**1.4**	**1.6**
1000	92	**0.7**	**1.0**	**0.7**	**1.0**	**0.0**	**0.7**	**2.2**	**1.3**	**1.5**
1100	92	**0.6**	**0.9**	**0.6**	**0.8**	**0.0**	**0.6**	**1.9**	**1.1**	**1.2**

		Maximum Overpressure (dBL) based on Pioneer's design with 2 decks (66 lbs / 30 kg per delay)									
Separation Distance (m)	Maximum Load Per Delay	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9	EQ 10
400	30	**127.2**	**124.4**	**115.5**	**95.5**	**98.2**	**119.8**	**124.6**	**127.5**	**127.4**	**126.7**
450	30	**126.4**	**123.5**	**114.4**	**94.4**	**97.3**	**119.3**	**123.6**	**126.8**	**126.7**	**125.3**
500	30	**125.8**	**122.6**	**113.4**	**93.4**	**96.4**	**118.8**	**122.8**	**126.2**	**126.1**	**123.9**
550	30	**125.2**	**121.8**	**112.5**	**92.5**	**95.6**	**118.4**	**122.0**	**125.6**	**125.6**	**122.8**
600	30	**124.7**	**121.0**	**111.6**	**91.6**	**94.9**	**118.0**	**121.2**	**125.1**	**125.1**	**121.7**
650	30	**124.2**	**120.4**	**110.9**	**90.9**	**94.2**	**117.7**	**120.6**	**124.7**	**124.6**	**120.7**
700	30	**123.7**	**119.7**	**110.2**	**90.2**	**93.6**	**117.3**	**119.9**	**124.2**	**124.2**	**119.8**
750	30	**123.3**	**119.1**	**109.5**	**89.5**	**93.0**	**117.0**	**119.4**	**123.8**	**123.8**	**119.0**
800	30	**122.9**	**118.6**	**108.9**	**88.9**	**92.5**	**116.7**	**118.8**	**123.5**	**123.4**	**118.2**
850	30	**122.5**	**118.1**	**108.3**	**88.3**	**92.0**	**116.5**	**118.3**	**123.1**	**123.1**	**117.5**
900	30	**122.2**	**117.6**	**107.8**	**87.8**	**91.5**	**116.2**	**117.8**	**122.8**	**122.8**	**116.9**
950	30	**121.8**	**117.2**	**107.2**	**87.2**	**91.0**	**116.0**	**117.4**	**122.5**	**122.5**	**116.2**
1000	30	**121.5**	**116.7**	**106.7**	**86.7**	**90.6**	**115.7**	**116.9**	**122.2**	**122.2**	**115.6**
1100	30	**120.9**	**115.9**	**105.8**	**85.8**	**89.8**	**115.3**	**116.1**	**121.6**	**121.7**	**114.5**

		Maximum Calculated Ground Vibration (mm/s) based on Pioneer's design with 2 decks (66 lbs per delay)								
Separation Distance (m)	Maximum Load per delay (Kg)	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9
400	30	**1.2**	**1.8**	**1.2**	**1.6**	**0.0**	**1.2**	**3.6**	**2.5**	**2.7**
450	30	**1.0**	**1.5**	**1.0**	**1.4**	**0.0**	**1.0**	**3.0**	**2.0**	**2.2**
500	30	**0.8**	**1.3**	**0.9**	**1.2**	**0.0**	**0.8**	**2.6**	**1.7**	**1.8**
550	30	**0.7**	**1.1**	**0.8**	**1.0**	**0.0**	**0.7**	**2.3**	**1.4**	**1.6**
600	30	**0.6**	**0.9**	**0.7**	**0.9**	**0.0**	**0.6**	**2.0**	**1.2**	**1.3**
650	30	**0.5**	**0.8**	**0.6**	**0.8**	**0.0**	**0.5**	**1.8**	**1.0**	**1.2**
700	30	**0.5**	**0.7**	**0.5**	**0.7**	**0.0**	**0.5**	**1.6**	**0.9**	**1.0**
750	30	**0.4**	**0.7**	**0.5**	**0.6**	**0.0**	**0.4**	**1.5**	**0.8**	**0.9**
800	30	**0.4**	**0.6**	**0.5**	**0.6**	**0.0**	**0.4**	**1.4**	**0.7**	**0.8**
850	30	**0.4**	**0.5**	**0.4**	**0.5**	**0.0**	**0.4**	**1.3**	**0.6**	**0.7**
900	30	**0.3**	**0.5**	**0.4**	**0.5**	**0.0**	**0.3**	**1.2**	**0.6**	**0.7**
950	30	**0.3**	**0.5**	**0.4**	**0.5**	**0.0**	**0.3**	**1.1**	**0.5**	**0.6**
1000	30	**0.3**	**0.4**	**0.3**	**0.4**	**0.0**	**0.3**	**1.0**	**0.5**	**0.5**
1100	30	**0.2**	**0.4**	**0.3**	**0.4**	**0.0**	**0.2**	**0.9**	**0.4**	**0.5**

		Maximum Overpressure (dBL) based on Pioneer's design with 3 decks (44 lbs / 20 kg per delay)									
Separation Distance (m)	Maximum Load Per Delay	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9	EQ 10
400	20	**126.3**	**123.3**	**114.2**	**94.2**	**97.1**	**119.2**	**123.5**	**126.7**	**126.6**	**125.0**
450	20	**125.6**	**122.3**	**113.1**	**93.1**	**96.1**	**118.7**	**122.5**	**126.0**	**125.9**	**123.6**
500	20	**124.9**	**121.4**	**112.1**	**92.1**	**95.3**	**118.2**	**121.6**	**125.4**	**125.3**	**122.3**
550	20	**124.4**	**120.6**	**111.2**	**91.2**	**94.5**	**117.8**	**120.8**	**124.9**	**124.8**	**121.1**
600	20	**123.8**	**119.9**	**110.3**	**90.3**	**93.7**	**117.4**	**120.1**	**124.4**	**124.3**	**120.1**
650	20	**123.3**	**119.2**	**109.6**	**89.6**	**93.1**	**117.1**	**119.4**	**123.9**	**123.9**	**119.1**
700	20	**122.9**	**118.6**	**108.9**	**88.9**	**92.4**	**116.7**	**118.8**	**123.5**	**123.4**	**118.2**
750	20	**122.4**	**118.0**	**108.2**	**88.2**	**91.9**	**116.4**	**118.2**	**123.1**	**123.0**	**117.4**
800	20	**122.0**	**117.5**	**107.6**	**87.6**	**91.3**	**116.1**	**117.7**	**122.7**	**122.7**	**116.7**
850	20	**121.7**	**117.0**	**107.0**	**87.0**	**90.8**	**115.9**	**117.2**	**122.3**	**122.3**	**116.0**
900	20	**121.3**	**116.5**	**106.5**	**86.5**	**90.4**	**115.6**	**116.7**	**122.0**	**122.0**	**115.3**
950	20	**121.0**	**116.0**	**105.9**	**85.9**	**89.9**	**115.4**	**116.2**	**121.7**	**121.7**	**114.7**
1000	20	**120.7**	**115.6**	**105.5**	**85.5**	**89.5**	**115.1**	**115.8**	**121.4**	**121.4**	**114.1**
1100	20	**120.1**	**114.8**	**104.5**	**84.5**	**88.7**	**114.7**	**115.0**	**120.8**	**120.9**	**113.0**

		Maximum Calculated Ground Vibration (mm/s) based on Pioneer's design with 3 decks (44 lbs per delay)								
Separation Distance (m)	Maximum Load per delay (Kg)	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7	EQ 8	EQ 9
400	20	**0.9**	**1.3**	**0.9**	**1.2**	**0.0**	**0.9**	**2.7**	**1.7**	**1.9**
450	20	**0.7**	**1.1**	**0.8**	**1.0**	**0.0**	**0.7**	**2.3**	**1.4**	**1.5**
500	20	**0.6**	**0.9**	**0.7**	**0.9**	**0.0**	**0.6**	**2.0**	**1.1**	**1.3**
550	20	**0.5**	**0.8**	**0.6**	**0.8**	**0.0**	**0.5**	**1.7**	**1.0**	**1.1**
600	20	**0.5**	**0.7**	**0.5**	**0.7**	**0.0**	**0.4**	**1.5**	**0.8**	**0.9**
650	20	**0.4**	**0.6**	**0.5**	**0.6**	**0.0**	**0.4**	**1.4**	**0.7**	**0.8**
700	20	**0.4**	**0.5**	**0.4**	**0.5**	**0.0**	**0.4**	**1.2**	**0.6**	**0.7**
750	20	**0.3**	**0.5**	**0.4**	**0.5**	**0.0**	**0.3**	**1.1**	**0.5**	**0.6**
800	20	**0.3**	**0.4**	**0.3**	**0.4**	**0.0**	**0.3**	**1.0**	**0.5**	**0.6**
850	20	**0.3**	**0.4**	**0.3**	**0.4**	**0.0**	**0.3**	**0.9**	**0.4**	**0.5**
900	20	**0.2**	**0.4**	**0.3**	**0.4**	**0.0**	**0.2**	**0.9**	**0.4**	**0.5**
950	20	**0.2**	**0.3**	**0.3**	**0.3**	**0.0**	**0.2**	**0.8**	**0.3**	**0.4**
1000	20	**0.2**	**0.3**	**0.3**	**0.3**	**0.0**	**0.2**	**0.8**	**0.3**	**0.4**
1100	20	**0.2**	**0.3**	**0.2**	**0.3**	**0.0**	**0.2**	**0.7**	**0.3**	**0.3**

EXPLOTECH

Specialists in Explosives, Blasting and Vibration
Consulting Engineers

August 13, 2014

Nova Construction Co. Ltd.
P.O. Box 1328
Antigonish, Nova Scotia
B2G 2L7

Attention: Mr. Paul White

Subject: Commentary on Pre – Blast Inspections
Stellarton Mine, Stellarton, Pictou County, Nova Scotia

Dear Mr. White,

As follow up to questions regarding the typical procedures related to the execution of pre-blast inspections in Canada, we offer the following brief description of the rationale behind such inspections and the typical practice followed in their execution.

While in the proximity of blasting operations there exists an intrinsic tendency to ascribe any apparently "new" deficiencies to the vibrations generated and the operations involved, most blasting activity produces insufficient impacts to cause cracking. It is essential that all significant impacts on the structure be included as part of the investigation in an effort to improve the accuracy of ascertaining the principal cause of the changes. Differential thermal expansion, structural overloading, chemical changes in building materials, shrinkage and swelling of wood, fatigue and aging of building materials, foundation settlement and the impacts of human habitation all induce transient deformation with particle motions similar to those induced by construction operations. The key difference lies in the lack of startle associated with environmental and occupancy effects. Fears expressed concerning vibration cracking in structures are often a result of the sensitivity of the human body to vibration.

Every structure will experience cracking and dislocation over its lifetime in response to a variety of environmental and physical influences. Pre-blast inspections are often performed as a means of alleviating concerns expressed by homeowners in close proximity to blasting

operations and to provide a baseline for assessing and evaluating complaints of damage following the completion of operations. These inspections are designed to provide a representative sampling of pre-existing deficiencies and are not intended to be an exhaustive detailing of all defects contained within the inspected property.

Explotech's protocol for the pre-blast inspection of small scale residential buildings (detached, semi-detached, town houses), includes a minimum of four (4) visits to each residence by Explotech engineers to advise of the upcoming operations, explain the inspection process and procedure, schedule appointments to perform the inspection and answer any questions or concerns related to the blasting. With each visit, written correspondence is provided giving details of the project and contact information for Explotech. In the event that contact with the owners is not achieved, a refusal letter is left after the final visit requesting contact from the owner if an inspection is desired at a later date. For commercial buildings and buildings in excess of two stories in height, inspections are limited to the ground and subgrade floors again in order to obtain a representative sampling of pre-existing defects. This policy has been adopted based on predictable building response to imposed vibrations and in order to ensure the feasibility of pre-blast inspections.

In addition to pre-blast inspections, properly executed blasting operations will include a vibration monitoring program. These programs are designed to measure vibrations generated as a result of the blasting operations to ensure compliance with contract and industry standards and alleviate any risk of damage to surrounding structures. In the event of any complaints of possible damage, the vibration monitoring reports, along with any available pre-blast inspection documentation, form an integral part in assessing and investigating the purported damage. The number of monitoring units installed and specific installation locations is typically at the discretion of the vibration engineer and varies depending on blasting and site parameters.

Quarry and mining operations in most Canadian provinces do not contain specific requirements for pre-blast inspections and, in fact, the application of pre-blast inspections are generally not recommended in such applications. The rationale behind this practice is due to the long term operational nature of mines and quarries and greater

value associated with vibration monitoring programs. The average residential home will develop one new crack every two weeks in response to a variety of forces including those listed above regardless of the imposition of blast vibrations. It is largely impossible to distinguish these environmentally induced cracks from those induced by vibration sources. For construction projects, blasting operations typically last a matter of weeks or months such that the time delay between pre-blast and post-blast conditions is relatively short. This permits an accurate assessment of new cracks and the timing of their appearance. For quarry and mining operations, blasting typically spans several years and more often decades. Given the advanced time periods for deficiency generation and the multitude of sources for their generation, the pre-blast documentation provides far less insight into the time and source of the deficiency. As such, in such applications, it is more common to rely on the science associated with vibration monitoring in order to ascertain whether the blast vibrations represent a scientifically credible source of a deficiency.

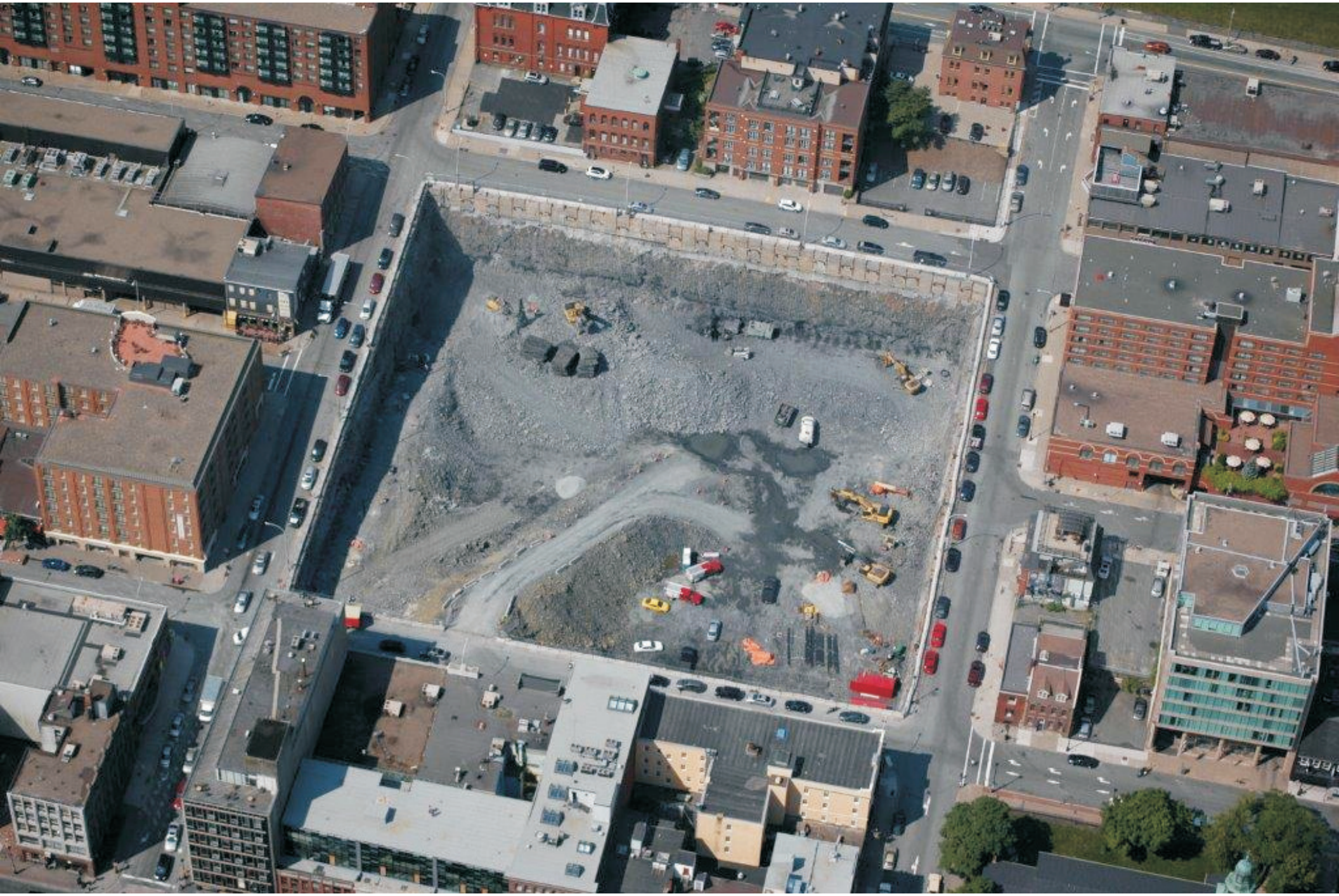
In summary, we would not recommend the execution of pre-blast inspections for a long term mining or quarry operation for the reasons listed above. We trust the above clarifies the issues related to pre-blast inspections. Should you have any further questions, please do not hesitate to contact us at your leisure.

Kindest regards,

Rob Cyr, P. Eng.

Attachment 2

Aerial of Nova Centre Complex



Attachment 3

Public Consultation Report

Public Consultation

Public consultation is a key element in the environmental assessment and industrial approval process in that it allows the proponent to present to and gather information from communities surrounding the project site and use this information in final project design. Pioneer Coal understands the value of public engagement and appreciates the community input on the project and envisions a long and mutually beneficial public engagement program for the Project.

Section 1.0 Methods of Involvement

The intent of the public involvement program was to:

a) provide information about the amendment to the project methods (i.e request for blasting);

b) elicit questions / concerns / suggestions from the local community and other stakeholders; and,

c) attempt to address those questions / concerns either through the provision of information or accommodating changes to the Project design.

The consultation session was undertaken as a result of request by Pioneer Coal to amend the 2004 Environmental Assessment (EA) Approval and Industrial Approval (IA) for the project. The amendments are required to allow the blasting of cap rock over the lower coal seam as a method of extraction for the remainder of the contract. The consultation was used to provide the public with current information on the environmental status of the property in question and to acquire their input in the process.

Invitations were sent to the Towns of Stellarton to meet with Mayor and Council to present the changes to the project prior to the community meeting, but yielded no response. The local community is already familiar with Pioneer Coal as an operator in this area and familiar with extractive industries as the mine has been in operation since 1995.

The following listed activities have been undertaken by the Company with respect to public consultation and communications:

- Notice of Intent (mail out, notices and bulletins)
- Letter to the First Nations Community

- Discussions with stakeholders, government agencies, councilors.
- Public Information and Participation Session regarding EA amendment

Materials used as part of the public consultation program are located in the appendices of this report.

Section 2.0 Public Information Session

A Public Information Session was held in Stellarton, Nova Scotia on Wednesday, April 30th, 2014 (12 pm to 9 pm) at the Museum of Industry – Multipurpose Room (Appendix 1). The Session was advertised in the community newspaper - The News on April 26th and April 30th; and in the provincial newspaper - The Chronicle-Herald, on April 26th (Appendix 2).

A series of five panels (Appendix 3) provided information on the proponent, project and need for the amendment, as outlined here:

Poster Name	Poster Description
Project Overview	A brief history of the mining project.
Why are we here?	Describes the Environmental Assessment process as an important planning tool and how the community input is important to the process.
EA Amendment Process	Any change to the original approved EA process requires additional public participation, studies, and reporting of the amendment.
Plan View of Area	Map overlaid with proposed location of blasting and proximity to residents.
Cross Section of Area	Image depicting a cross section of the area of rock requiring to be blasted and the underlying coal seam.

Participants were welcomed and asked to sign in to the Session. Participants were provided with a pamphlet and the structure of the Session before the panels were informally presented. A summary of the number of participants and their home community is provided in Table 2.1. Participants viewed the various panels of information and were assisted by company representatives and consultants with any questions they had. Comments from the participants were recorded on flipcharts for other participants to view. This format allows all participants to get a sense of the primary issues/concerns raised, how Pioneer Coal answered these questions, and how they used this information to address specific aspects of the Project. A summary of the questions and comments is provided in Table 3.2.

TABLE 2.1: HOME COMMUNITIES OF PUBLIC INFORMATION SESSION PARTICIPANTS

Community	Number of People
Stellarton, NS	27
New Glasgow, NS	3
Pictou County, NS	1
Plymouth, NS	1
Evansville, Stellarton	3
Total	**35**

2.1 First Nations

Pioneer Coal will engage in discussions as warranted and are cognizant of the "Made in Nova Scotia Process" for Mi'kmaq engagement. A separate copy of this response will be sent by Pioneer Coal to the First Nations communities if requested. Any concerns that are forthcoming to Pioneer Coal will be submitted to NSE as part of the public review.

First Nations input through the EA public review process is important and encouraged by Pioneer Coal. Pioneer Coal will be pro-active in its attempt to address any First Nation's concerns.

2.2 Regulatory Agency Consultation

Prior to commencing the environmental assessment amendment process, Pioneer Coal engaged in discussion / meetings with NSE officials to understand the process of amending the existing operation and the legislative requirements in the successful approval of the project. These discussions/ meetings served to assist with defining the project operations and identifying possible impediments to the project that can't be addressed through design or management, of which none were noted. Subsequently, a letter from NSE requesting the information on aspects of the project was received by Pioneer Coal. A Public Consultation report was one of the requested pieces of information to be used in determining if an approval for an amendment is warranted. Pioneer Coal will continue to be in contact with this and other regulatory agencies as the project progresses.

Section 3.0 Public Comments and Steps taken to Address Public Issues and Concerns

An important element of public consultation is to use the information gathered during the session in the final design of a project. Pioneer Coal had two primary questions they required

public feedback on regarding blasting. Table 3.1 presents a summary of responses to these questions. In addition, Pioneer Coal recorded all comments and questions (Table 3.2) made at the Public Information Session and have used this feedback in consideration of the project's final design.

TABLE 3.1: SUMMARY OF STAKEHOLDER RESPONSES TO TWO MAIN QUESTIONS RE: BLASTING

Question	Responses
What would be the best time of day to blast?	1. During school hours so children will be in school. But not during recess or lunch. 2. "Between 10am and 2pm but not during lunch." 3. Not at night time 4. 3pm, once the children are home from school. During class time would cause a disruption. 5. On a set day every time for consistency (eg. Every Friday at 11:00am). 6. Have a regular alternate day in the event that Friday will not work (Eg. if not Friday, the following Tuesday @ 11:00am)
What would be the best way to notify you of the blasts?	1. 24-48 hours prior - knock on each door to those in close proximity (800m) 2. Notice sent to each house 3. News paper, radio 4. Inform schools with phone call 5. Horn immediately pre and post blast 6. McGreggor Rd will be temporarily shut down during blasts.

TABLE 3.2: SUMMARY OF COMMENTS AND CONCERNS RAISED BY THE PUBLIC

Question/Issue	Response
What's the purpose of the blasting?	To remove the hard cap rock above the coal seam. Equipment has been added over time to address this hardened cap rock, however the only available option left is to crack it with a small blast to ease its removal.
How many blasts will there be?	Maximum 1 per week for the remainder of the project.
Will the methane in the coal cause explosions as a result of blasting?	The blasts will be in the cap rock, not the coal itself. Previous testing of methane levels revealed amount is below limits. Previous operations included highwall mining that monitored methane levels with no issue.
Will the vibrations from blast cause damages to dwellings and cause sinking of homes?	The blasts are designed on the type of rock and proximity to the closest homes. Vibrations might be felt but will be below the required limit of 12.5mm/s peak particle velocity for ground vibration, which will not cause damage to homes or result in sinking.
Where will vibration monitors be set up?	Yes, there will be several vibration monitors set up on the perimeter of the mine to test the vibrations from the blasts.
Will blasting cause any shafts under the town to collapse?	Pioneer Coal has hired blasting experts to design blasts to minimize risks.
Will damages to my home, or other, be compensated for by Pioneer Coal?	If damage is done as a direct result of blasting, Pioneer Coal would consider compensation.

TABLE 3.2: SUMMARY OF COMMENTS AND CONCERNS RAISED BY THE PUBLIC

Question/Issue	Response
What safety precautions will be taken during the blasts?	McGreggor Road will be temporarily shut down and the pit itself will be evacuated until the blast has occurred. Other safety measures will also be taken such as a horn and notices of the blast.
How will the public be informed of the 30-day public review period of the registration doc?	It will be posted in the local and provincial newspaper with a list of where to find both the digital and hard copies of the document.
Has there been blasting on site previously?	There has been no blasting to date on this site.
Will dust levels increase as a result of the blasting?	Average dust amounts are not projected to increase as a result of the blasts. High dust levels will be intermittent but levels will not exceed the acceptable levels. Monitors are set up on the perimeter of the mine to ensure accurate readings during/post blasts. Also, better management of stockpiles and infilling will result in smaller piles and therefore less dust. - Feedback: site needs to have more dust monitors and in better locations/downwind.
Will blasting affect the water table, water tower, track, or power lines?	The proposed blast is designed to not have adverse effects on any of these. Monitoring will be completed during blasting events.
Is there a contact person community members can reach with any further concerns?	There is not one person listed, but community members are encouraged to contact the main office where there is an open door policy. Any comments and concerns will be passed along to the appropriate person. Pioneer Coal has a history of good management when it comes to community concerns.
Will the blasting continue through the summer months of July and August?	There is no processing of coal on site. No blasting or coal extraction will occur but stockpiles will be moved and other operations will continue on site throughout the summer.
How many more feet will the mine be dug down/blasted?	The existing mined depth at the Foord Stem will not be exceeded.
Has a third party study been done of the effects of blasting at this site?	Pioneer Coal has hired experts to design blasts that meet regulations and will maintain community integrity.

Appendix 1

Multipurpose Room, Museum of Industry, Stellarton

Pictures from Public information Session

Entrance and sign-in table

5 info panels and 2 flip charts

Two round tables and a café corner. Each table had note pad and paper for additional comments.

Appendix 2

Advertisement for Public Consultation

PUBLIC CONSULTATION

Amendment to Extraction Methods Stellarton Surface Coal Mine

Pioneer Coal Limited is seeking an Amendment to its Environmental Approvals based on a need to amend the methods of extraction at part of its Stellarton Surface Coal Mine.

As a part of the environmental assessment process, Pioneer Coal is conducting a public consultation session to provide project information and gather public input specific to the proposed changes to extraction methods.

You are cordially invited to attend the session any time between 12 noon and 9 pm on

Wednesday, April 30, 2014
Multipurpose Room, Museum of Industry
Stellarton, Nova Scotia

Pioneer Coal Limited
PO Box 1328, 3098 Post Road, Antigonish, NS B2G 2L7

Contact: Paul White, P.Eng. (902) 863-4004
novaconstruction@ns.sympatico.ca

Appendix 3

Information Panels

PIONEER COAL LIMITED
STELLARTON SURFACE COAL MINE

Project Overview

- The Area was deemed to be unsafe due to subsidence, near surface underground workings, old slopes and shafts, and abandoned concrete structures of previous legal and bootleg mining infrastructure.

- Stellarton Surface Coal Mine developed and operated by Pioneer Coal since 1996.

- Phase 1 - West of MacGregor Avenue
- Environmental Assessment Approval 1995

- Phase 2 - East of MacGregor Ave
- Environmental Assessment Approval 2004

- Coal recovered through conventional surface mining methods and innovative highwall mining technology.

- Mined out areas has been progressively reclaimed to create a safe, contoured, vegetated site with many amenities available to the Municipality and public.

PIONEER COAL LIMITED
STELLARTON SURFACE COAL MINE

Why are we here?

- Environmental Assessment (EA) is an important planning tool used in Nova Scotia to assist communities and proponents to design better projects. The EA process is used to promote sustainable development, while protecting the environment by evaluating all aspects of a project from ecological, environmental and socio-economic perspectives.

- Public consultation is an important component of the EA process and involves the public and all levels of government. Components of public consultation that the Nova Scotia EA process include:

    - Public notice of a meeting
    - Public input at the meeting
    - Information sharing with Mi'kmaq communities
    - Consultation with all levels of government
    - Using the collected information in the final project design

- A project report is registered with Nova Scotia Environment (NSE) who coordinate a review with other government departments.

- There is a 30 day public review and comment period after the project is registered via a registration document.

- A technical review is completed by the EA Branch of NSE and final approval is the decision of the Minister of Environment.

- Typically, an Industrial Approval is required after the EA Approval to construct, operate and reclaim a facility. The proponent must submit information on monitoring, sampling locations and other operations information.

PIONEER COAL LIMITED
STELLARTON SURFACE COAL MINE

EA Amendment Process

- Pioneer Coal Limited has operated the coal mine in Stellarton since 1996 using conventional methods for extraction of coal and new technology for highwall mining using the NOVAMINER 2000 ™.

- EA Approvals were granted in 1995 and 2004. Both projects included public consultation through the EA process and Industrial Approvals being granted by NS Environment.

- Rock overlying of the coal resource has been extracted by “free dig” methods but now requires a different approach for continued extraction of the coal in some areas.

- Changes to the extraction methods require public consultation as part of the EA process in Nova Scotia.

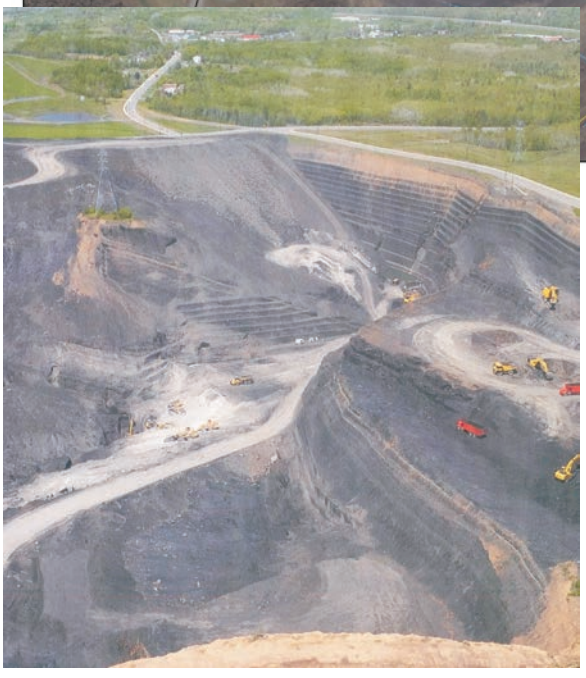
- NSE has indicated that information on the blasting schedule, site features, blast designs, monitoring plans and public consultation need to be provided to them to review this change in the extraction method.

- Pioneer Coal wishes to provide information on the change to the extraction methods and gather public input on the change via this public meeting. Public comments and how those comments will be documented as part of the submission to NS Environment.

PIONEER COAL LIMITED
STELLARTON SURFACE COAL MINE

Plan View of Area

Plan view of the mine site indicating area that requires blasting to access coal.



PIONEER COAL LIMITED
STELLARTON SURFACE COAL MINE

Cross Section of Area

Typical Cross Section of Material being accessed and location of rock band above the coasl seam to be blasted.