U. S. Department of Labor

MAR 26 2009

Mine Safety and Health Administration
100 Bluestone Road
Mount Hope, WV 25880-1000

Mr. Chris Blanchard
President
Performance Coal Company
P. O. Box 69
Naoma, WV 25140

Dear Mr. Blanchard:

Subject: Mine Ventilation Plan, Section 75.370, 30 CFR 75, Upper Big Branch Mine - South, I.D. No. 46-08436, Performance Coal Company, Montcoal, Raleigh County, West Virginia

This will acknowledge receipt of a revision to the ventilation plan, submitted to this office and dated March 12, 2009, proposing to construct one (1) permanent seal to replace an existing Mitchell-Barrett seal, designated as Seal No. 59 and located at the mouth of Tailgate 11 along the North Mains, in the subject mine. The plan includes the specific information required to construct a 50-psi, Minova "Main Line Tekseal", MSHA Approval No. 50M-02.0, and a professional engineer's certification that the MSHA approved seal design is applicable for installation at the proposed location. Also included in the plan contents is a certified map, dated March 12, 2009, showing the sealed area.

This revision is hereby approved and will be made a part of the approved plan for this mine. You are reminded that you need to comply with Section 75.337 of the Final Rule which requires certain notification to MSHA during certain phases of the seal construction and the submittal of quality control documentation after the seal construction is complete.

Should you have any questions concerning this matter, please contact the Ventilation Department at (304) 877-3900/Ext. 142.

Sincerely,

/s/ ROBERT G. HARDMAN

Robert G. Hardman
District Manager
Coal Mine Safety and Health, District 4

Cc: Mt. Hope Field Office (3incl.)/ Files/nlc

SUPERVISORY ACKNOWLEDGEMENT

RLL 3/26/09

Initials JM 3/26 Date

U. S. Department of Labor

Mine Safety and Health Administration
100 Bluestone Road
Mount Hope, WV 25880-1000

MAR 26 2009

Mr. Chris Blanchard
President
Performance Coal Company
P. O. Box 69
Naoma, WV 25140

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This revision is hereby approved and will be made a part of the approved plan for this mine. You are reminded that you need to comply with Section 75.337 of the Final Rule which requires certain notification to MSHA during certain phases of the seal construction and the submittal of quality control documentation after the seal construction is complete.

Should you have any questions concerning this matter, please contact the Ventilation Department at (304) 877-3900/Ext. 142.

Sincerely,

Robert G. Hardman
District Manager
Coal Mine Safety and Health, District 4

Performance Coal Company
P.O. Box 69 Naoma, WV 25140

March 12, 2009

Mr. Robert G. Hardman
Mine Safety and Health Administration
100 Bluestone Road
Mt. Hope, West Virginia 25880

Re: Upper Big Branch Mine
MSHA ID 46-08436
State Permit U-3042-92
Ventilation Plan Revision

Dear Sir:

Please find the enclosed revision to our ventilation plan. This revision requests the ability to construct a 50-psi Minova Seal at the Upper Big Branch Mine. This seal will be constructed in front of an existing Mitchell-Barrett seal that requires replacement. The MSHA Seal Approval Number for this design is 50M-02.0.

This revision is divided into two sections. The first section contains the Minova seal installation guidelines and the certification of this seal design from Environmental Resources Management Consulting Company, LLC. The original seal certification can be obtained from MSHA Technical Support at the MSHA District Manager's Request. The second section includes supplemental information required for seal construction under 30 CFR 75.335(c)(3).

At this time, Performance Coal Company, Inc. does not have a miners' representative at this operation. If you have any questions or concerns on this matter, please feel free to contact me at your convenience.

Respectfully submitted,
Performance Coal Company, Inc.

Matthew Walker
Mine Engineer

2265 Harrodsburg Road • Suite 200 • Lexington, Kentucky • 40504
phone (859) 381-1000 • fax (859) 381-1005

ENVIRONMENTAL RESOURCES MANAGEMENT CONSULTING COMPANY, LLC

March 9, 2009

Mr. Matthew Walker
Marfork Coal Company
PO Box 457
Whitesville, WV 25209

Re: 50-psi, Minova seals (MSHA Approval No. 50M-02.0)
Upper Big Branch Mine, Seal #59

Dear Mr. Walker:

On February 26, 2009, we examined the proposed site location for the proposed Minova Mine Seals. After our initial site visit and examination, the approved Minova Mine Seal is applicable for use at this location.

The measured dimensions at each site fall within the approved guidelines for construction of the Minova Seal. The existing seal is set back 14.5 feet from the outby pillar corner(s). Given the measured cross-cut dimensions of 8.5'H x 22'W, the anticipated seal thickness is 7.3', leaving the proposed seal 7.2' inby the outside pillar corner. In accordance with manufacture recommendations, the outby ribs will be reinforces with Tekflex or some other similar material. The proposed seal dimensions will have to be verified after site preparation by the professional engineer certifying construction.

I, Todd R Beavan, to the best of my knowledge and belief hereby certify that the proposed site observed at seal location 59 at the Upper Big Branch Mine is adequate for construction of the Minova Mine Seal (MSHA Approval No. 50M-02.0). No warranty is made as to the accuracy of the approved Minova 50 PSI mine seal and its ability to withstand a 50-psi mine explosion.

Respectfully Submitted,

Todd R Beavan, PE
Manager - Engineering

TODD R. BEAVAN
REGISTERED
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

MSHA
MOUNT HOPE WV
MAR 13 2009
RECEIVED
VENTILATION

Supplemental Ventilation Plan Information

30 CFR § 75.335 (c)(3): [The mine operator shall --] Provide the following information for approval in the ventilation plan –

(i) The MSHA Technical Support Approval Number:

50M – 02.0

(ii) A summary of the installation procedures:

A copy of the installation procedures has been attached.

(iii) The mine map of the area to be sealed and proposed seal locations that include the deepest points of penetration prior to sealing. The mine map shall be certified by a professional engineer or a professional land surveyor:

A 1 in. = 400 ft. scale certified mine map of the area has been attached.

(iv) Specific mine site information, including:

(A) Type of seal:

The type of seal to be used is the 50-psi Minova Main Line Tekseal. The 50-psi Minova Main Line Tekseal is intended for mine openings from 4 to 30 ft high and up to 30 ft wide. The entry where the seal is proposed is 8.5 feet high and 22 feet wide at its maximum dimensions. More information on this design is included in the first part of this plan.

(B) Safety precautions taken prior to seal achieving design strength:

The seal will achieve full design strength within 28 days of completion. Therefore, the atmosphere behind the seal will be monitored each working day until the seal reaches the achieved design strength, the quality control tests have been confirmed, and the final seal certification is submitted. Air will be sampled from the ten existing sample locations (Seals 33, 38, 43, 44, 47, 50, 53, 56, 62, and 63) that are part of the same sealed area. Samples will be taken using an MSHA approved detector and pump with capabilities necessary to draw and analyze samples from the atmosphere behind the seals. An airtight connection from the sample tube to the pump/detector will be made. Adequate purge times for each sampling location will be calculated and made available to certified persons conducting sampling. In the event any sample obtained indicates the atmosphere behind the seals is not inert (4.5%-17% methane and 10% or greater oxygen), men will be withdrawn from the entire mine, and State and Federal agencies will be notified. The area around the seal location will be adequately rock dusted.

(C) Methods to address site-specific conditions that may affect the strength and applicability of the seal including set-back distances:

Site-specific conditions that may affect the strength and applicability of the seal have been evaluated by Environmental Resources Management Consulting to determine that they fit within the seal design criteria. A

copy of this certification is attached. As stated in 30 CFR § 75.335 (c)(2), a professional engineer shall be designated to conduct or have oversight of seal installation and certify that the provisions in the approved seal design have been addressed. At this time, Todd Beavan of Environmental Resources Management Consulting (a West Virginia Professional Engineer) has been designated for this certification. A copy of this certification will be forwarded to MSHA. The seal will be constructed approximately 7 feet from the corner of the pillar. In accordance with Page 1 Item A2 of the seal design, the ribs will be reinforced with Tekflex.

(D) Site Preparation:

The site preparations articles listed on Pages 1 and 2 of the attached Seal Installation Guidelines will be followed. The seal location will be cleaned and all loose material removed from the roof, ribs, and floor. The surfaces at the seal perimeter will be as rough as practically possible, a minimum of 1 inch per 4 feet. The exposed surfaces will be cleared to minimize dust and rock dust will be removed from the strata within the seal form. The seal will be installed approximately 7 feet inby the rib. Two cribs will be installed on the outby side of the seal location. The form will be constructed using the wood and brattice method described in the guidelines.

(E) Sequence of seal installations:

The area is currently sealed off by existing Mitchell-Barrett seals. Seal 59 is the only seal to be constructed.

(F) Projected date of completion of each set of seals:

Upon approval of this plan, the construction of the seal will begin at the first available time that Wright Concrete is available. The seal should be completed approximately 3 days after commencement of construction. In accordance with 30 CFR § 75.337 (e)(1), the District Manager will be notified between two and fourteen days prior to the commencement of seal construction. The District Manager will also be notified of any changes to the time frame of completion. In accordance with 30 CFR § 75.337 (e)(2), notification of completion will be sent in writing within five days of the completion of the seals.

(G) Supplemental roof support inby and outby each seal:

The seal location was developed in November of 1998. Roof supports were installed per the approved mine roof control plan. Additional supports will be installed by constructing two cribs outby the seal.

(H) Water flow estimation and dimensions of the water drainage system through the seals:

A water drainage system will be installed in the new seal. The drainage system will be one 8-inch non-metallic, corrosion resistant SDR 7 HDPE pipes with a 240-psi internal pressure rating. The drainage system must be equipped to prevent the exchange of air through the pipe. A water trap and valve will be installed on the outby side of each drainage pipe. The valve and its connections must have blast resistance of 240-psi, in accordance with the approved seal design. The valve must be installed on the inby side of the water trap. The water trap must be U-shaped, and the vertical depth of the U must be large enough that a sufficient quantity of water can be maintained in the trap to prevent evaporation prior to the scheduled periodic examination. The U-portion of the water trap may be recessed into the mine floor to minimize the depth of water against the seal and to strengthen its blast resistance. A drawing showing the typical water drainage system layout is included. The water drainage system of the new seal will be connected to the water drainage system of the existing seal. The existing seal contains one 8-inch pipe with less than 10 gpm flowing through it.

(I) Methods to ventilate the ouby face of seals once completed:

The method to ventilate the outby face of the seals will not change from the currently approved ventilation plan. Return air will ventilate the seals and will exit the mine at the portal. If any seal is greater than 20 feet from the rib corner, a check curtain will be maintained to within no more than 10 feet of the face of the seal.

(J) Methods and materials used to maintain each type of seal:

Weekly inspections will be conducted to ensure the integrity of the seals. Any repairs will be in accordance with 30 CFR § 75.337 and pages 8 and 9 of the attached seal installation guidelines.

(K) Methods to address shafts and boreholes in the sealed area:

This submittal is for the replacement of an existing seal in a set of six seals. The new seal will be constructed directly in front of an existing seal. Therefore, this section does not apply to the construction of the proposed seal.

(L) Assessment of potential for overpressures greater than 120 psi in sealed area:

The sealed area does not contain a homogeneous mixture of methane between 4.5 percent and 17.0 percent and oxygen exceeding 17.0 percent throughout the entire area. Sealed atmosphere sample results at this set show the oxygen content to be 19.9 percent and the methane concentration to be 0.1 percent. There is no potential for pressure piling to result in overpressures greater than 120 psi in the sealed area. There is no likelihood of a detonation in the area to be sealed.

(M) Additional sampling locations:

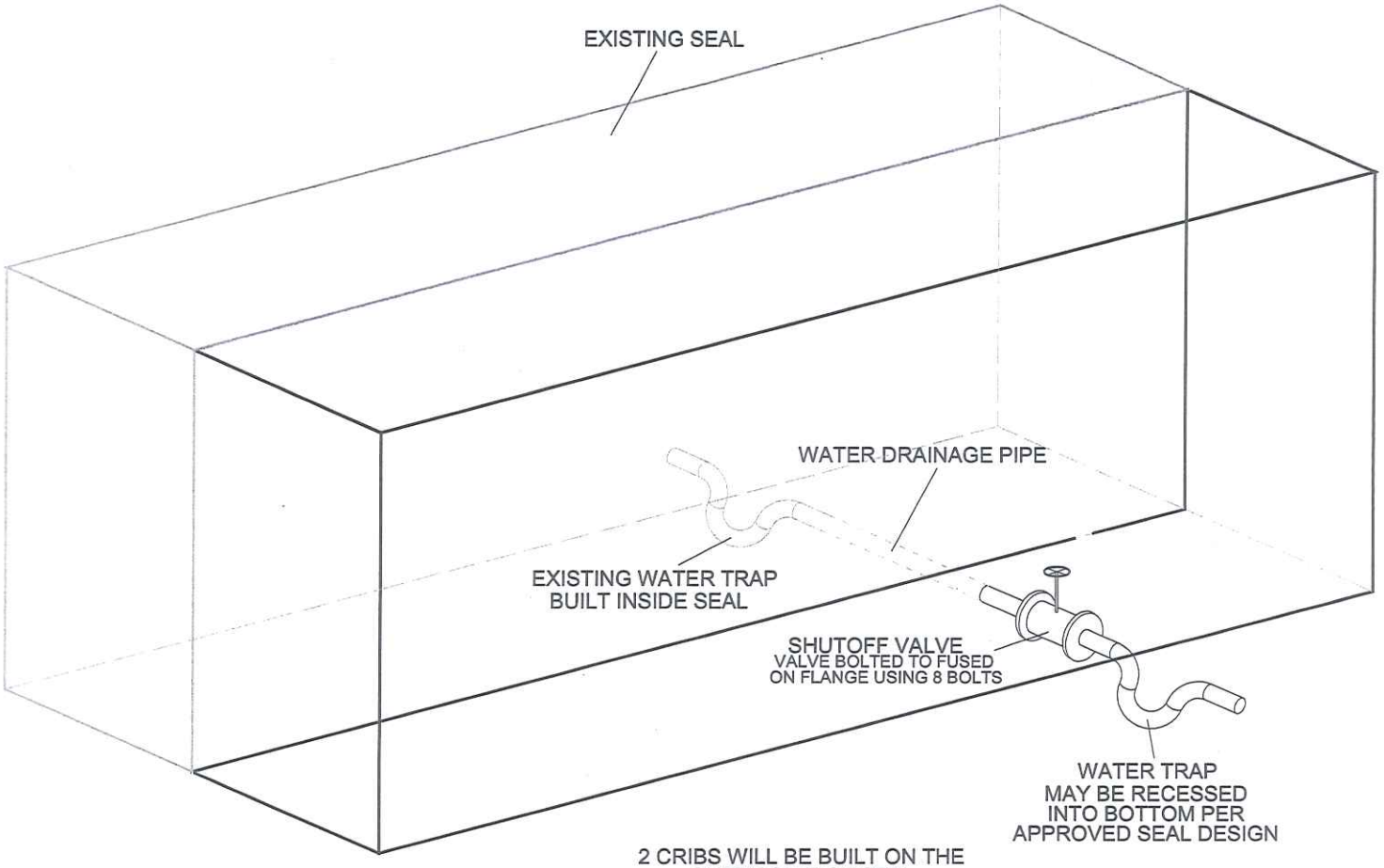
The entire sealed area will contain the newly constructed 50-psi seal and 31 other existing 20-psi seals. There are 10 sample locations in the existing seals that are currently being sampled daily (24 hours). There is no sampling tube in the new seal, therefore these 10 existing sampling locations will continue to be monitored until a plan is submitted to the district manager and approved for a different frequency of sampling.

(N) Additional information required by the District Manager:

Performance Coal Company, Inc. has designated Environmental Resources Management Consultants, who is familiar with the approved design of the seal, to certify that the seal design meets the criteria of the application and is adequate for this site (certification is attached). A final certification will be submitted to the district manager after the seals have been completed and the quality control tests results are verified.

The existing seal that will be replaced does not contain a sampling pipe. The existing seal will be utilized as a back wall for the new seal. No space will exist between the existing seal and new seal. Therefore, no air sampling pipe will be installed in the new seal.

The following certified persons will be designated in accordance with 30 CFR 75.337(c) to directly supervise seal construction: Homer Wallace and Gary May. Other certified persons may be designated provided they are trained in the plan prior to the construction of seals. Homer Wallace will be designated as the senior management official who will certify the construction, installation and materials were used in accordance with approved ventilation plan. The training certifications will be retained at the mine site for a period of one year.



2 CRIBS WILL BE BUILT ON THE
OUTBY SIDE OF SEAL
AS PER 75.335(c)(3)(iv)(G)

PERFORMANCE COAL COMPANY
P.O. BOX 69, NAOMA, WV 25140

UPPER BIG BRANCH MINE

M.S.H.A. ID No. 46-08436		WV ID No. U-3042-92
DATE: 03-12-09	SCALE: NTS	DWG No. 1 of 1
DRAWN BY: Rt. 3 Staff		CHECKED BY:

TYPICAL SEAL INSTALLATION

PREPARED BY
RT3 ENGINEERING

MSHA Approval Number: 50M-02.0
50 psi MINOVA MAIN LINE TEKSEAL®
Minova, USA, Inc.
For information, contact David Himes at (800) 626-2948
Or, for customers west of the Mississippi, contact
Joe Burdette at (970) 245-4007

SEAL INSTALLATION GUIDELINES FOR THE MINOVA MAIN LINE TEKSEAL

A. Site Preparation:

1. Tekseal is palleted in polyethylene-lined bags, or as a bulk pack. The entire pallet is then covered with an impervious plastic wrap, or raincoat, which completely covers the pallet. This packaging enables outside storage in all conditions. Bagged material must not be stored directly on the ground in areas with standing water.

2. The seal must be located in stable conditions. Pillar stability shall be judged by the Certifying Professional Engineer *(CPE)* during the seal installation. To minimize air leakage, Minova recommends that the seal shall not be located less than 5 feet from the corner of any pillar. If the seal is to be located less than 10 feet from the corner of the pillar, Minova recommends that the ribs be reinforced with Tekflex® or some other, similar material. (If this occurs on the inby side of the seal, this will be done prior to seal installation.)

3. The ribs, floor, and roof will be scaled to competent strata prior to placement of the seal. All loose material must be removed from the seal location for a distance of 3 feet ± 6 inches on each side of the seal.

4. Rock dust should be removed from the strata within the seal form by compressed air, high pressure water, or mechanical means.

5. The strata at the seal perimeter should be as rough as practically possible, minimizing smooth surfaces. Surface roughness should not be less than 1 inch per 4 feet. This can be established by placing a 4-foot long straight edge against the strata and measuring the surface variation perpendicular to the edge. Surfaces smoother than this requirement must be mechanically roughened, at the designation of the CPE, during the seal installation.

6. Surfaces upon which Tekseal is to be placed do not have to be dry but must be reasonably free from standing or running water. All debris, oil, and unsound material must be removed, at the designation of the CPE, during the seal installation. Flowing water will be diverted or pumped away from the seal sites.

7. Supplemental roof support must be provided by the mine operator, consistent with any approved plans on both the outby and inby sides of the seal.

8. Good housekeeping practices should be observed, such as removing any debris within 50 feet of the area being sealed.

B. Form Sequence Guidelines – Wood & Brattice:

1. Each pair of forms shall be constructed to ensure the minimum thickness of the Tekseal, as indicated in the table titled "Form Thickness Specification Table – Wood and Brattice Forms". The minimum seal thickness is based on the maximum height and width of the entry after loose strata has been removed. When the opening height or width is between values on the appropriate design table, the next larger thickness should be used. The forms can be constructed to any thickness, as long as it meets the minimum required thickness outlined in the "Form Thickness Specification Table - Wood and Brattice Forms".

   The minimum thickness of the seal and the formwork is based on the maximum height and width of the entry once the area is prepped for construction, subject to the judgment of the CPE, during the seal installation.

2. For wood and brattice seal walls, vertical site specific posts and/or cribs shall be used. Posts should be 4" x 4" or larger and shall be installed in each wall on typical centers of thirty (30) inches ± 6 inches. Cribs shall be a typical 6" X 6" X 30" or larger and installed with no more than 36 inches from crib to crib. Minova recommends using cribs for wall supports but understands that it may not be practical in all circumstances.

3. Rib-to-rib fly boards (1"x 6" ± 2 inches or equivalent) will be horizontally attached to the inner face of the posts or cribs on centers of 18 inches ± 6 inches.

4. For wood frame and brattice cloth walls, a brattice cloth shall be hung over the interior of the formwork, leaving no more than a 3-inch ± 1 inch overlap on the roof, rib, and floor.

   The brattice cloth overlap must be kept to a minimum, in order to maximize contact of the Tekseal with the strata. The brattice cloth and framing shall be maintained in place for the duration of the seal life. In the event the brattice cloth is damaged to the extent that the Tekseal material is visible, it will be the responsibility of the operator to replace the damaged cloth.

5. The front/outby wall shall have one or more temporary hatches that will allow access to the inside of the forms during the construction process.

6. A water drainage system must be installed during seal construction in the lowest elevation seal(s) of the set. This seal is not designed to impound water, other than to a minimal, unavoidable depth. The actual size and number of pipes must be based on the anticipated maximum flow rate at the seal location. Recommended pipe sizes will range between 4 inches and 8 inches in diameter. The pipes used must be non-metallic and corrosion resistant and have an internal pressure rating of at least 240 psi. If more than one drainage pipe is installed in the seal, the horizontal distance between the pipes must not be less than 2 ½ times their diameter. The distance between the ribs and the drainage pipes shall not be less than 2 ½ times their diameter. Pipes must be installed as low as practical, to minimize the depth of water against the inby side of the seal. A minimum of 4 inches will be maintained between the bottom of the pipe and the floor. The actual height of the pipe in the seal will depend upon the gradient of the floor and allow gravity drainage of water inby the seal.

   Pipe sections must be joined in accordance with the pipe manufacturer's installation recommendations. Pipe joints and couplers must have resistance to internal pressure of at least 240 psi.

   The drainage system must be equipped to prevent the exchange of air through the pipe(s). A water trap and valve will be installed on the outby side of each drainage pipe. The valve and its connections must have blast resistance equivalent to at least 240 psi. The valve must be installed on the inby side of the water trap. Water traps must be U-shaped, and the vertical depth of the U-portion of the trap must be large enough that a sufficient quantity of water can be maintained in the trap to prevent evaporation prior to the scheduled periodic examination. The U-portion of the water trap may be recessed into the mine floor to minimize the depth of water against the seal and to strengthen its blast resistance.

   A low weir catchment, no more than 12 inches high, must be constructed across the total width of the entry.

7. Each newly constructed seal shall have one (1) non-metallic sampling tube, extending into the next connecting crosscut, as described in 30 CFR §75.337(g)(1). The diameter and material for the sampling pipe will be submitted to the MSHA District Manager by the mine operator in the Mine Ventilation Plan, and it will be between ¼ and 1 inch diameter, with a pressure rating of 240 psi. The inby end of the sampling tube will be placed at not more than 12 inches from the roof.

   If the new seal is placed on the outby side of an existing seal, non-metallic gas sampling pipes, rated at 240 psi, shall be connected to each sampling pipe in each seal. The new gas sampling pipe will have a new 50 psi shutoff valve installed outby the seal. If there is any space between the new and existing seal, that area will also be provided with a sampling pipe of the same specifications.

At the discretion of the mine, inertization pipe(s) may be installed for injecting an inert gas into the sealed mine area. If inertization pipes are used, the CPE shall specify the size, rating, location and spacing of such pipes in the seal.

8. Three (3) pressurization fill pipes, 1¼-inch diameter PVC, shall be inserted through the brattice cloth and/or fly boards. The first will be located in the center of the seal ± 2 feet and as close to the roof as possible. The two (2) remaining fill pipes shall be placed 3 feet ± 1 foot from each rib and as close to the roof as possible.

   Bleeder pipes, 1¼ inches to 2 inches in diameter, can be used to confirm complete filling of any roof void greater than 2.5 feet in height. The bleeder pipes will be plugged with rags after the material flow is evident and prior to final pressurization.

   Any seal that exceeds 10 feet in thickness, based on the "Form Thickness Specification Table - Wood and Brattice Forms", shall have six (6) pressurization fill pipes in two rows of three. Each row will terminate 2/3 ± 1 foot and 1/3 ± 1 foot of the thickness from the front/outby wall.

9. Approved PUR/foam pack or equivalent can be used around the perimeter of the brattice cloth and pipe annular openings in curtain to minimize leakage during the material pressurization.

C. Form Sequence Guidelines – Kennedy & CMU Block:

1. Position form walls to insure the minimum thickness stated in the table, "Thickness Specification-Installation Table - Kennedy or Block Forms". This is achieved rib to rib and floor to roof.

   The minimum thickness is based on the maximum height and width of the entry, once the area is prepped for construction.

   The forms can be constructed to any thickness, as long as it meets the minimum required thickness outlined in the "Thickness Specification-Installation Table - Kennedy or Block Forms".

2. For Kennedy forms, install horizontal rails no more than 24 inches apart or away from floor or roof.

   Install panels on rails, again insuring the seal's interior thickness meets or exceeds the minimum thickness requirement.

   Leave desired number of Kennedy panels lowered from the roof to be used as a window for filling the seal.

   Form ties can be used as long as they are non-conductive. Standing support on the outside of the seal is a good alternative to form ties, as long as the standing support will resist any form movement.

3. A water drainage system must be installed during seal construction in the lowest elevation seal(s) of the set. This seal is not designed to impound water, other than to a minimal, unavoidable depth. The actual size and number of pipes must be based on the anticipated maximum flow rate at the seal location. Recommended pipe sizes will range between 4 inches and 8 inches in diameter. The pipes used must be non-metallic and corrosion resistant and have an internal pressure rating of at least 240 psi. If more than one drainage pipe is installed in the seal, the horizontal distance between the pipes must not be less than 2 ½ times their diameter. The distance between the ribs and the drainage pipes shall not be less than 2 ½ times their diameter. Pipes must be installed as low as practical to minimize the depth of water against the inby side of the seal. A minimum of 4 inches will be maintained between the bottom of the pipe and the floor. The actual height of the pipe in the seal will depend upon the gradient of the floor and allow gravity drainage of water inby the seal.

   Pipe sections must be joined in accordance with the pipe manufacturer's installation recommendations. Pipe joints and couplers must have resistance to internal pressure of at least 240 psi.

   The drainage system must be equipped to prevent the exchange of air through the pipe(s). A water trap and valve will be installed on the outby side of each drainage pipe. The valve and its connections must have blast resistance equivalent to at least 240 psi. The valve must be installed on the inby side of the water trap. Water traps must be U-shaped, and the vertical depth of the U-portion of the trap must be large enough that a sufficient quantity of water can be maintained in the trap to prevent evaporation prior to the scheduled periodic examination. The U-portion of the water trap may be recessed into the mine floor to minimize the depth of water against the seal and to strengthen its blast resistance.

   A low weir catchment, no more than 12 inches high, must be constructed across the total width of the entry.

4. Each newly constructed seal shall have one (1) non-metallic sampling tube, extending into the next connecting crosscut, as described in 30 CFR §75.337(g)(1). The diameter and material for the sampling pipe will be submitted to the MSHA District Manager by the mine operator in the Mine Ventilation Plan, and it will be between ¼ and 1 inch in diameter, with a pressure rating of 240 psi. The sampling tube will be placed at not more than 12 inches from the roof.

   If the new seal is placed on the outby side of an existing seal, non-metallic gas sampling pipes, rated at 240 psi, shall be connected to each sampling pipe in each seal. The new gas sampling pipe will have a new 50 psi shutoff valve installed outby the seal. If there is any space between the new and existing seal, that area will also be provided with a sampling pipe of the same specifications.

At the discretion of the mine, inertization pipe(s) may be installed for injecting an inert gas into the sealed mine area. If inertization pipes are used, the CPE shall specify the size, rating, location and spacing of such pipes in the seal.

5. Three (3) pressurization fill pipes, 1¼-inch diameter PVC, shall be inserted through the Kennedy panels. The first will be located in the center of the seal ± 2 feet and as close to the roof as possible. The two (2) remaining fill pipes shall be placed 3 feet ± 1 foot from each rib and as close to the roof as possible.

   Any seal that exceeds 10 feet in thickness, as required by the "Thickness Specification-Installation Table - Kennedy or Block Forms", shall have six (6) pressurization fill pipes positioned in two rows of three. One row will extend 2/3 into the seal ± 2 feet, and the other row will terminate 1/3 into the seal ± 2 feet.

   Bleeder pipes, 1¼ inches to 2 inches in diameter, can be used to confirm complete filling of any roof void greater than 2.5 feet in height. The bleeder pipes will be plugged with rags after the material flow is evident and prior to final pressurization.

6. For best results, use approved foam pack or equivalent to seal the perimeter and seams.

D. Tekseal Placement:

Minova's Tekplacer is the only machine currently approved for placement of Tekseal, and no alternative pumps may be used for the placement of Tekseal without Minova's prior approval. Additionally, Minova reserves its right to introduce new or modified equipment for the purpose of Tekseal placement.

1. Prior to placement of the Tekseal material in between the prepared forms, the Minova Tekplacer will be calibrated in accordance with the following procedure:

   During the initial start-up of the seal project and the start of each pumping sequence, the Tekplacer machine will be calibrated to insure that the Tekseal material is proportionally correct. The following is an example of the information that will be documented during the calibration process.

   Water Temperature: 69.4 °F
   Hose Length: 600'
   Hose Diameter: 1¼"

Calibration

Time to dump 5 bags (min & sec): 1 min 50 sec = min + (sec/60) = 1.83 min

(powder pounds = 5 x 45 lbs = 225 lbs)

Throughput (powder pounds ÷ time): 123.0 **lbs/min**

Water to Solids (lbs/min X 1.25 for Tekseal divided by 8.34 = 18.4 **gpm**

Drum Dimensions (Dia" x H"): 20" x 30" Volume = (Dia. x Dia. x H) ÷ (2,200): 5.46 ft^3

Time to fill drum (min & sec): 55 sec = min + (sec/60) = .92 min

Output (volume ÷ time): 5.93 **ft^3/min**

Powder pounds per Cubic Yard = (throughput ÷ output) x (27): 560.0 lbs/yd^3

Mix Strength = (lbs/yd^3) ÷ (45): 12.4 **$bags/yd^3$**

2. The existing mine water supply of at least 25 gpm at 50 psi is sufficient for the preparation of the Tekseal material. Should there be concerns about the quality of the mixing water, Minova will evaluate it to ensure compatibility with Tekseal and make chemical adjustments to the water if necessary.

   Should the mixing water show excessive foaming when tested with Tekseal, then the amount of liquid defoamer required to reduce foaming to a normal level will have to be determined. Once this dosage level has been determined, the standard Tekseal QC test procedure will be carried-out using the mixing water dosed with an appropriate level of defoamer.

   In the field, the liquid defoamer will be dosed at the predetermined controlled rate into the mixing water prior to its contact with the Tekseal.

3. The hose will be moved and positioned, as necessary, during placement, to provide uniform and complete filling of the form. Care must be taken to direct the flow of Tekseal along the back of the form wall and into the corners of the formed area to assure complete filling against the formwork and at the roof and rib contacts.

   Tekseal's unique design allows for cold joints due to pumping interruptions. In the event pumping is interrupted for more than eight (8) hours, the roughness of the cold joint will be documented. If the surface roughness is less than 2 inches over 4 feet, measures will be taken to mechanically roughen the surface of the cold joint.

4. A minimum of nine (9) samples from each seal will be taken, as follows: The first three (3) samples from the bottom will be taken once the entire floor is covered; the next three (3) samples will be taken from the middle once the Tekseal material reaches half the height of the seal; and, the last three (3) samples will be taken from the upper third of the seal height. Sampling for the test specimens must be done in a completely random and unbiased manner.

   Each of the samples in the testing stages outlined above will be taken directly from a tap on the seal manifold or the end of the material discharge hose and placed into a Minova-supplied testing cup. Each sample will be filled to the top of the supplied cup, making sure that large air pockets are not entrapped during the sampling process. Any excess material will be screed off with a straight edge, the lid will be secured in place, and the sample stored in an upright position. The samples are to remain in the mine to cure under approximately the same conditions as the seal for 28 days.

   If the minimum 400 psi is required in less than 28 days, an additional nine (9) samples can be taken and tested at the desired time period.

   All samples will be crushed to determine the unconfined compressive strength. The average compressive strength must be greater than 400 psi with not more than two (2) samples testing below 400 psi, and no samples testing below 300 psi.

5. Whenever possible, the Tekseal discharged from the hose should be observed. Any changes from the normal appearance and consistency are sufficient reason to cease pumping and investigate the cause of the change

E. Time Required for Seal to Reach Design Strength:

The standard Tekseal mixture (typically 517 lbs/yd3) will reach its intended strength (400 psi) after 28 days. Adding more pounds of Tekseal per cubic yard will achieve the minimum design 400 psi strength in a shorter time period. This is controlled by standard calibration procedures, as previously described. If an evaluation of the design strength is required at an earlier curing time, additional samples, per the sampling protocol, are necessary.

F. Surface Drying Effects:

The surface drying effects are only an issue if the brattice or form material is damaged and the Tekseal surface is exposed to the atmosphere. Drying effects are not rapid, and the weekly inspection cycles provide more than adequate time intervals to re-establish surface protection. Examiners will be instructed to verify the brattice is intact. If the brattice or form is damaged, or the Tekseal is otherwise exposed to the atmosphere, the brattice will be repaired or other measures will be taken to cover the exposed Tekseal.

G. Seal Voids:

If there is any loss of contact with the roof, rib, or wall, a direct Minova Field Repair certified technician will propose a repair procedure, which will be subject to MSHA's approval before its implementation. The procedure will specify that the voids shall be filled with a non-shrinking material, with a minimum cured strength of 400 psi. It will also state that, before injection, any dried Tekseal material must be removed from the vicinity of the void. The grout shall be pumped into the voids using open-ended injection pipes until it is apparent the void is filled, as witnessed by grout flowing back past the injection pipe. The seal shall then be checked for air leakage to ensure the void has been completely filled. This procedure is applicable to any size or position of a seal void.

If the leaks are determined to be only on the outby face of the seal, and there is no loss of contact with the surrounding rock or coal, the leak(s) may be filled with a low-density polyurethane foam, such as Silent Seal® or equivalent. The manufacturer's instructions shall be adhered to. Again, the seal must be checked for air leakage afterwards to ensure the job has been successful.

H. Strata Fracture

If the strata surrounding the seal are badly fractured, or other factors indicate the shear strength of such strata or coal is less than the shear strength of Tekseal, then reinforcement of the strata will be evaluated. The strata can be ring-grouted with a minimum 400 psi grout such as Minova's Tekgrout injection grout, an equivalent cement-based grout, or 20-70 lbs. per-cubic-foot density polyurethane grout. In addition, the strata can be reinforced with additional bolting or the seal should be hitched into the strata. Check the seal afterwards to ensure the grouting has been successful by the use of typical air leakage detection tools such as smoke tubes or other approved detection devices.

Sometimes it may be better to undertake seal voids and strata fractures as one repair project. The grout used to make seal repairs will migrate into the surrounding strata, sealing and strengthening it.

I. Maximum Allowable Convergence:

The Tekseal system was specifically designed for deep, high-convergence mines, and it has repeatedly demonstrated its ability to accept significant levels of entry closure. An independent laboratory confirmed, during the triaxial compression tests, that Tekseal exhibits increasing compressive and shear strengths as the confinement pressure is increased. Further, under confinement of less than hydrostatic pressure, Tekseal deforms through the development of micro-fractures and not along planes of weakness associated with the internal angle of friction. These ductile properties (deformation under load) indicate the seal could accept as much as 20% convergence (18% under laboratory tests) and possibly maintain shear, tensile, and compressive strengths above its unconfined values. Values of maximum acceptable convergence (roof to floor closure as measured vertically at the midpoint of the entry at the outby face of the seal) are shown in the attached tables for the various entry heights contained therein. The actual convergence may be measured at the outby entry using extensometers, "pogo" sticks or any other approved measuring device.

J. Storage Conditions for Construction Materials:

Tekseal is palleted in polyethylene-lined bags and then the entire pallet is covered with an impervious plastic wrap, or raincoat, which completely covers the pallet or as a bulk pack. This packaging enables outside storage in all conditions. Hardened material will be discarded. Bagged material must not be stored directly on the ground in areas with standing water. Tekseal has a shelf life of three months. A "use by" date of each batch is clearly indicated on each corresponding pallet. **Beyond this period, and depending on storage conditions, it may become a little slower to gel. Standard Tekseal QC test procedure will be carried-out on expired material to determine if it still passes all the tests, with the exception of the long-term strength test. Minova may grant shelf life extensions of 30 days beyond the "use by" date, depending on the results of those tests.**

K. Contact Information

For detailed information on the use and application of this seal, contact Mr. David Himes, Project Manager, Minova USA, Inc., 150 Carley Court, Georgetown, Kentucky, 40324, phone number 800-626-2948. For more detailed information for customers west of the Mississippi, contact Mr. Joe Burdette, Vice President – Sales Western Division, 2306 Highway 6 & 50, Grand Junction, CO, 81505, phone number 970-245-4007.

Minova USA, Inc.

Thickness Specification - Installation Table - Wood and Brattice Forms

50-psi Blast Loading Seal

(Based on the seal design described in the Seal Approval Information Template)

Entry Height, ft	Maximum Acceptable Convergence, in	Entry width, ft																	
		14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
4	9.60	4.0	4.0	4.0	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	
4.5	10.80	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	
5	12.00	4.5	4.6	4.6	4.7	4.7	4.8	4.8	4.9	4.9	4.9	5.0	5.0	5.0	5.1	5.1	5.1	5.1	
5.5	13.20	4.8	4.9	4.9	5.0	5.1	5.1	5.2	5.2	5.3	5.3	5.3	5.4	5.4	5.4	5.5	5.5	5.5	
6	14.40	5.0	5.1	5.2	5.3	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.7	5.8	5.8	5.8	5.9	
6.5	15.60	5.3	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.9	5.9	6.0	6.0	6.1	6.1	6.2	6.2	6.2	
7	16.80	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.1	6.2	6.3	6.3	6.4	6.4	6.5	6.5	6.5	6.6	
7.5	18.00	5.8	5.9	6.0	6.1	6.2	6.3	6.3	6.4	6.5	6.6	6.6	6.7	6.7	6.8	6.8	6.9	6.9	
8	19.20	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.8	6.9	7.0	7.0	7.1	7.1	7.2	7.2	
9	21.60	6.4	6.5	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.8	7.8	7.9	
10	24.00	6.7	6.9	7.1	7.2	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.3	8.4	8.5	
11	26.40	7.1	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	
12	28.80	7.4	7.6	7.8	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	
13	31.20	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.0	9.2	9.3	9.5	9.6	9.7	9.8	9.9	10.0	10.1	
14	33.60	8.0	8.2	8.4	8.7	8.9	9.1	9.2	9.4	9.6	9.7	9.9	10.0	10.1	10.3	10.4	10.5	10.6	
15	36.00	8.2	8.5	8.7	9.0	9.2	9.4	9.6	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.8	11.0	11.1	
16	38.40	8.4	8.7	9.0	9.3	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.5	
17	40.80	8.7	9.0	9.3	9.5	9.8	10.0	10.2	10.5	10.7	10.8	11.0	11.2	11.4	11.5	11.7	11.8	12.0	
18	43.20	8.9	9.2	9.5	9.8	10.0	10.3	10.5	10.8	11.0	11.2	11.4	11.6	11.7	11.9	12.1	12.2	12.4	
19	45.60	9.1	9.4	9.7	10.0	10.3	10.6	10.8	11.1	11.3	11.5	11.7	11.9	12.1	12.3	12.5	12.6	12.8	
20	48.00	9.2	9.6	9.9	10.2	10.5	10.8	11.1	11.3	11.6	11.8	12.0	12.2	12.4	12.6	12.8	13.0	13.2	
21	50.40	9.4	9.8	10.1	10.5	10.8	11.1	11.3	11.6	11.9	12.1	12.3	12.6	12.8	13.0	13.2	13.4	13.5	
22	52.80	9.6	10.0	10.3	10.7	11.0	11.3	11.6	11.9	12.1	12.4	12.6	12.9	13.1	13.3	13.5	13.7	13.9	
23	55.20	9.7	10.1	10.5	10.8	11.2	11.5	11.8	12.1	12.4	12.6	12.9	13.2	13.4	13.6	13.8	14.0	14.2	
24	57.60	9.9	10.3	10.7	11.0	11.4	11.7	12.0	12.3	12.6	12.9	13.2	13.4	13.7	13.9	14.1	14.3	14.6	
25	60.00	10.0	10.4	10.8	11.2	11.6	11.9	12.2	12.6	12.9	13.1	13.4	13.7	13.9	14.2	14.4	14.7	14.9	
26	62.40	10.1	10.6	11.0	11.4	11.7	12.1	12.4	12.8	13.1	13.4	13.7	13.9	14.2	14.5	14.7	14.9	15.2	
27	64.80	10.3	10.7	11.1	11.5	11.9	12.3	12.6	13.0	13.3	13.6	13.9	14.2	14.5	14.7	15.0	15.2	15.5	
28	67.20	10.4	10.8	11.3	11.7	12.1	12.5	12.8	13.2	13.5	13.8	14.1	14.4	14.7	14.9	15.2	15.5	15.8	
29	69.60	10.5	11.0	11.4	11.8	12.2	12.6	13.0	13.4	13.7	14.0	14.3	14.7	14.9	15.2	15.5	15.8	16.0	
30	72.00	10.6	11.1	11.5	12.0	12.4	12.8	13.2	13.5	13.9	14.2	14.6	14.9	15.2	15.5	15.8	16.0	16.3	

Note: Direct shear strength of grout on rock from lab test results as provided by Minova USA

Minova USA, Inc.

Thickness Specification - Installation Table - Kennedy or Block Forms

50-psi Blast Loading Seal

(Based on the seal design described in the Seal Approval Information Template)

Entry Height, ft	Maximum Acceptable Convergence, in	Entry width, ft																
		14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4	9.60	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4.5	10.80	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.1
5	12.00	4.0	4.0	4.0	4.0	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.5
5.5	13.20	4.1	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8
6	14.40	4.4	4.5	4.5	4.6	4.7	4.8	4.8	4.9	4.9	5.0	5.0	5.0	5.1	5.1	5.1	5.2	5.2
6.5	15.60	4.6	4.7	4.8	4.9	5.0	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.5	5.5	5.5	5.6
7	16.80	4.9	5.0	5.1	5.2	5.3	5.3	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.8	5.8	5.9	5.9
7.5	18.00	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.8	5.9	6.0	6.0	6.1	6.1	6.2	6.2	6.3
8	19.20	5.3	5.4	5.6	5.7	5.8	5.9	6.0	6.0	6.1	6.2	6.3	6.3	6.4	6.4	6.5	6.5	6.6
9	21.60	5.7	5.9	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.7	6.8	6.9	7.0	7.0	7.1	7.2	7.2
10	24.00	6.1	6.3	6.4	6.6	6.7	6.8	6.9	7.1	7.2	7.3	7.4	7.4	7.5	7.6	7.7	7.7	7.8
11	26.40	6.4	6.6	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.8	7.9	8.0	8.1	8.1	8.2	8.3	8.4
12	28.80	6.7	6.9	7.1	7.3	7.5	7.7	7.8	8.0	8.1	8.2	8.3	8.4	8.6	8.7	8.8	8.8	8.9
13	31.20	7.0	7.3	7.5	7.7	7.9	8.0	8.2	8.4	8.5	8.7	8.8	8.9	9.0	9.1	9.2	9.4	9.4
14	33.60	7.3	7.5	7.8	8.0	8.2	8.4	8.6	8.8	8.9	9.1	9.2	9.3	9.5	9.6	9.7	9.8	9.9
15	36.00	7.5	7.8	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.6	9.8	9.9	10.0	10.2	10.3	10.4
16	38.40	7.8	8.1	8.3	8.6	8.8	9.0	9.3	9.5	9.6	9.8	10.0	10.2	10.3	10.5	10.6	10.7	10.9
17	40.80	8.0	8.3	8.6	8.9	9.1	9.3	9.6	9.8	10.0	10.2	10.4	10.5	10.7	10.9	11.0	11.2	11.3
18	43.20	8.2	8.5	8.8	9.1	9.4	9.6	9.9	10.1	10.3	10.5	10.7	10.9	11.1	11.3	11.4	11.6	11.7
19	45.60	8.4	8.7	9.0	9.3	9.6	9.9	10.1	10.4	10.6	10.8	11.0	11.2	11.4	11.6	11.8	12.0	12.1
20	48.00	8.6	8.9	9.3	9.6	9.9	10.1	10.4	10.7	10.9	11.1	11.4	11.6	11.8	12.0	12.2	12.3	12.5
21	50.40	8.8	9.1	9.5	9.8	10.1	10.4	10.7	10.9	11.2	11.4	11.7	11.9	12.1	12.3	12.5	12.7	12.9
22	52.80	8.9	9.3	9.6	10.0	10.3	10.6	10.9	11.2	11.5	11.7	12.0	12.2	12.4	12.6	12.8	13.0	13.2
23	55.20	9.1	9.5	9.8	10.2	10.5	10.8	11.1	11.4	11.7	12.0	12.2	12.5	12.7	12.9	13.2	13.4	13.6
24	57.60	9.2	9.6	10.0	10.4	10.7	11.0	11.4	11.7	12.0	12.2	12.5	12.8	13.0	13.2	13.5	13.7	13.9
25	60.00	9.3	9.8	10.2	10.5	10.9	11.2	11.6	11.9	12.2	12.5	12.8	13.0	13.3	13.5	13.8	14.0	14.2
26	62.40	9.5	9.9	10.3	10.7	11.1	11.4	11.8	12.1	12.4	12.7	13.0	13.3	13.5	13.8	14.0	14.3	14.5
27	64.80	9.6	10.0	10.5	10.9	11.3	11.6	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.3	14.6	14.8
28	67.20	9.7	10.2	10.6	11.0	11.4	11.8	12.2	12.5	12.8	13.2	13.5	13.8	14.0	14.3	14.6	14.8	15.1
29	69.60	9.8	10.3	10.7	11.2	11.6	12.0	12.3	12.7	13.0	13.4	13.7	14.0	14.3	14.6	14.8	15.1	15.4
30	72.00	9.9	10.4	10.9	11.3	11.7	12.1	12.5	12.9	13.2	13.6	13.9	14.2	14.5	14.8	15.1	15.4	15.6

Note: Direct shear strength of grout on rock from lab test results as provided by Minova USA