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Applicant(s)
AEL Mining Services Limited

Inventor(s)
Pienaar, Andre; Wilson, Laurence Justin Pienaar; Dreyer, Pieter Etienne

Agent / Attorney
FB Rice, Level 23 44 Market Street, Sydney, NSW, 2000

Related Art
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ABSTRACT

A method of charging a blasting borehole (58) includes submerging a lower portion of a conduit (50) in a main explosive charge (62) in a blasting borehole (58) such that an upper portion (52) of the conduit (50) is exposed, and feeding a booster pack (26) into the conduit (50) so that the booster pack (26) is at or below an upper surface level of the main explosive charge (62) in the blasting borehole (58).
Invention Title:

Charging of blasting boreholes

The following statement is a full description of this invention including the best method of performing it known to us:-
CHARGING OF BLASTING BOREHOLES

THIS INVENTION relates to the charging of blasting boreholes. In particular, the invention relates to a method of charging a blasting borehole, to a booster pack feeding device and to a booster pack feeding kit.

In many mining applications, for example open cast coal mining, blasting is typically accomplished by sinking blasting boreholes for blast holes into a ground body (e.g. an ore-carrying ground body or a coal-carrying ground body) which is to be mined and inserting controlled detonation explosive charges into these boreholes. The explosive charge typically includes a main explosive charge, usually in the form of a slurry, and a booster pack (typically a blasting cord and booster or a detonator and booster), with the booster including an intermediary explosive charge. The explosive charge is then detonated by means of the booster pack thereby explosively to break loose a portion or area of the ground body, e.g. to facilitate the conducting of open cast mining by way of surface excavation.

In some blasting applications, for example open cast coal mining, there is a risk of hot boreholes caused by spontaneous combustion of unmined coal deposits, i.e. an underground fire, in the vicinity of the boreholes. As will be appreciated, hot boreholes carry the risk of premature and uncontrolled detonation of an explosive charge inside such a hot borehole. Such an occurrence presents a serious safety concern to borehole sinking and explosive charge loading operators, as a borehole charged with an explosive may detonate whilst other boreholes are still being charged or loaded, i.e. whilst personnel is still in the vicinity.

One approach to counteract the risk of premature detonation in a hot borehole is to use a booster pack with special heat insulation thereby to delay premature detonation as a result of heat exposure. This approach fits in well with current industry standard practices and methods and has the advantage that explosive initiation depths can be controlled by the user as the booster pack is first loaded into the borehole before the main explosive charge is loaded. Usually, premature detonation of the booster pack, prior to loading of the main explosive charge, in a borehole under
extreme conditions is not fatal to personnel. Disadvantages of this approach however include that there is significant risk when the working window is extended, i.e. when the period between charging of a borehole with a main explosive charge and the planned controlled detonation of the borehole is extended, and that the booster pack requires a complicated configuration to resist high temperatures.

According to one aspect of the invention, there is provided a method of charging a blasting borehole, the method including

- submerging a lower portion of a conduit in a main explosive charge in a blasting borehole such that an upper portion of the conduit is exposed; and
- feeding a booster pack into the conduit so that the booster pack is at or below an upper surface level of the main explosive charge in the blasting borehole.

Typically, the booster pack is fed into the conduit just prior to initiating a blast thereby reducing the risk of an unplanned detonation.

Typically, the conduit is upwardly extending, usually substantially vertically extending.

Submerging a lower portion of a conduit in a main explosive charge in a blasting borehole may include inserting said lower portion of the conduit in the blasting borehole and subsequently charging the blasting borehole with the main explosive charge. The main explosive charge may be a flowable explosive, e.g. a slurry explosive such as emulsions. Typically, the flowable explosive is pumped into the blasting borehole.

Instead, although expected to be a less preferred and less practical approach, submerging a lower portion of a conduit in a main explosive charge in a blasting borehole may include charging the blasting borehole with the main explosive charge and subsequently submerging said lower portion of a conduit in the main explosive charge. Typically however, the main explosive charge, particularly when it is a slurry explosive, has a high viscosity and a high specific density, which may make it difficult to submerge or push in said lower portion of a conduit in the main explosive charge once the main explosive charge has been loaded into the blasting borehole.
Preferably, a lower end of the conduit is closed to prevent the main explosive charge from entering the conduit. The lower end may be closed by a plug, which may fit in or over the conduit. The plug may have a tapered profile. Accordingly, the method preferably includes preventing ingress of the main explosive charge into the conduit.

The method may include earthing the conduit to reduce the risk of build-up of static electricity as a result of triboelectric charging.

Preferably, the conduit is of an anti-static material, or is treated with an anti-static agent, in order to reduce or eliminate build-up of static electricity. The conduit should preferably be of a material, or be treated with an anti-static agent, such that it provides for a charge decay half life of static charge of less than 1 second. Typically, the conduit will exhibit a surface resistivity of between 100 000 and $50 \times 10^6$ ohms.

In one embodiment of the invention, the conduit is an anti-static PVC conduit.

The method may include suspending the conduit from a suspension formation over a mouth of the blasting borehole. In one embodiment of the invention, the suspension formation is in the form of an elongate body or member, e.g. a bar or pipe or the like, spanning across the mouth of the borehole.

In another embodiment of the invention, the suspension formation includes a housing or anchor body to which a conduit can be connected and at least one support member to support the housing or anchor body over a mouth of the blasting borehole and with the conduit thus in use suspended from the housing or anchor body.

The suspension formation in this embodiment of the invention preferably has at least two support members, more preferably at least three support members. The support member or members may be displaceable between a retracted or folded condition and an extended or unfolded condition.
Advantageously, the suspension formation may be configured to assist to resist flotation of the conduit as a result of the presence of the main explosive charge or water in the borehole.

The suspension formation may include a connector to connect the conduit to the suspension formation. When the suspension formation includes a housing or anchor body, the connector may be in the form of a socket formation to receive a free end of the conduit. Instead, the connector may be in the form of a spigot formation configured to be inserted into a free end of a conduit. The connector may be defined by the housing or anchor body.

The housing may initially house or carry a booster pack. Typically, the booster pack is positioned inside the housing such that when the housing is connected to a conduit, the booster pack is located over a mouth of the conduit or, more preferably, inside the conduit.

The housing may also house an elongate flexible member connected or connectible to the booster pack. The elongate flexible member may be coiled or wound inside the housing. In one embodiment of the invention, the elongate flexible member is an ignition signal transmission line, e.g. a detonating cord or electrical wire or optical fibre, used to detonate the detonator of the booster pack.

Feeding a booster pack into the conduit may include lowering the booster pack, typically in controlled fashion from the housing downwards into the conduit by means of the elongate flexible member. Typically, the booster pack is lowered to a predetermined depth inside the conduit, and thus a predetermined depth inside the blasting borehole.

The booster pack may include a weight to increase the mass of the booster pack thereby to facilitate lowering of the booster pack down the conduit.

The suspension formation may include a release formation for the booster pack, the release formation being configured on activation to release the booster pack from the housing so that the booster pack is lowered or drops down the conduit. In one embodiment of the invention, the release formation is in the form of an activation pin.
which is pulled from the booster pack, activating the booster pack for detonation and releasing the booster pack from the housing. Advantageously, the release formation may be configured to be activated remotely from a safe distance.

The method may include filling the conduit at least partially with a liquid with a desirable boiling point or equilibrium vapour pressure, so that in the event of a hot blasting borehole, sufficient vapour produced by heating of said liquid in the hot blasting borehole can escape from an upper end of the conduit to provide a visible and/or audible signal. As will be appreciated, this can serve as a visible and/or audible warning that the blasting borehole is at a high temperature. Advantageously, the liquid inside the conduit may also assist in limiting temperatures inside portions of the conduit below the surface of the liquid to the boiling temperature of the liquid, e.g. about 100°C in the case of water.

The method may include providing a whistle in flow communication with the conduit so that escaping vapour, when present, can produce an audible sound. This can serve as an audible warning that the blasting borehole is at a high temperature.

The liquid may be water.

The liquid may be fed into the conduit subsequent to inserting said lower portion of the conduit into the blasting borehole. An upper end or end portion of the conduit thus may have an opening through which a liquid can be fed into the conduit.

The whistle may be located in or on the suspension formation, e.g. on the housing.

The conduit may be extensible. In one embodiment of the invention, the conduit is telescopic and the method includes extending the conduit telescopically, prior to or during inserting said lower portion of the conduit in the blasting borehole.

The conduit may be circular cylindrical and may have an internal diameter of at least 50 mm, preferably at least 75 mm, more preferable at least 100 mm, e.g. about 75 mm or about 100 mm.
In another embodiment of the invention, the conduit includes at least two conduit lengths and a conduit connector, the method including connecting the conduit lengths by means of the conduit connector to form said conduit, prior to or during inserting said lower portion of the conduit in the blasting borehole. Naturally, the conduit may include more than two conduit lengths and a plurality of conduit connectors.

The method may include monitoring one or more conditions inside the blasting borehole prior to, and preferably also after, the main explosive charge has been loaded into the blasting borehole. This may be done, for example, using the method taught in South African Patent No. 2010/01384.

The booster pack may thus include at least one borehole condition sensor, e.g. a temperature sensor, which is in communication with a blasting borehole condition monitor located externally of the blasting borehole.

Instead, the conduit may carry at least one sensor, e.g. a temperature sensor. The sensor may be carried by the plug of the conduit. A signal transmission line may extend between the sensor and the blasting borehole condition monitor.

The blasting borehole condition monitor may be attached to the conduit, or attached to or incorporated in the suspension formation.

According to another aspect of the invention, there is provided a booster pack feeding device for feeding a booster pack into a conduit of which a lower portion is submerged in a main explosive charge in a blasting borehole with an upper portion of the conduit being exposed, the device including

a housing releasably housing or carrying a booster pack, the housing being connectable to said upper portion of said conduit, or being mountable above said upper portion of said conduit.

In this specification, it is intended that the term "mountable" includes concepts such as mountable to a conduit, supported above a conduit with or without contacting the conduit, and suspended above the conduit. Thus, the housing may be both connectable to said upper portion of the conduit and mountable above said upper
portion of said conduit. Furthermore, the housing may be in the form of an anchor body which merely anchors or carries the booster pack without enclosing or housing the booster pack, and/or which acts as an anchor or suspension formation for the conduit in use.

Preferable, the housing is configured such that the booster pack is aligned with a longitudinal axis of a conduit, when the housing is connected to the conduit.

The booster pack feeding device may form part of or may define a suspension formation configured to suspend said conduit in said blasting borehole. The suspension formation may be as hereinbefore described, and the housing of the booster pack feeding device may define the housing of the suspension formation. The housing may have an opening through which the booster pack can be fed into a conduit in use connected to the housing, or positioned below the housing.

The booster pack feeding device may thus include at least one support member to support the housing over a mouth of the blasting borehole and a connector to connect said upper portion of said conduit to the housing.

The housing may thus house an elongate flexible member connected or connectable to the booster pack.

The booster pack feeding device may include a release formation for the booster pack. The release formation may be configured on activation to release the booster pack from the housing so that the booster pack is lowered or drops down a conduit in use connected to the housing, or positioned below the housing. Advantageously, the release formation may be configured to be activated remotely from a safe distance.

The release formation may be in the form of an activator pin which is pulled from the booster pack, activating the booster pack for detonation and releasing the booster pack from the housing.
The booster pack feeding device may include or define an opening which in use is in flow communication with said upper portion of said conduit and a whistle in flow communication with said opening.

The booster pack may be as hereinbefore described.

The booster pack feeding device may include a blasting borehole condition monitor. The blasting borehole condition monitor may be as hereinbefore described. In particular, the blasting borehole condition monitor may be attached to or incorporated in the suspension formation.

According to a further aspect of the invention, there is provided a booster pack feeding kit which includes

- a booster pack feeding device as hereinbefore described; and
- a conduit connectable to the booster pack feeding device.

The conduit may be as hereinbefore described.

The kit may include a blasting borehole condition monitor configured to be located externally of a blasting borehole, separately from the booster pack feeding device and the conduit. The blasting borehole condition monitor may thus be as described in South African Patent No. 2010/01384.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings in which

- Figure 1 shows a three-dimensional view of a booster pack feeding device in accordance with the invention;
- Figure 2 shows a vertically sectioned three-dimensional view of the booster pack feeding device of Figure 1, connected to a conduit;
- Figure 3 shows a vertically sectioned three-dimensional view of the booster pack feeding device of Figure 1, connected to a conduit and being used in one embodiment of a method of charging a blasting borehole in accordance with the invention; and
- Figure 4 shows a vertically sectioned three-dimensional view of a blasting borehole being charged in accordance with another embodiment of the method of the invention.
Referring to Figure 1 of the drawings, reference numeral 10 generally indicates a booster pack feeding device in accordance with the invention. The booster pack feeding device 10 includes an elongate roughly generally circular cylindrical housing 12 of a synthetic plastics or polymeric anti-static material which defines an open ended spigot formation 14 at one end of the elongate housing 12. The spigot formation 14 is circular cylindrical and has a smaller outer diameter than an upper portion of the housing 12. Curved cut-outs 15 are provided in the spigot formation 14.

Three support members, in the form of equiangularly spaced foldable legs 16 are hingedly attached to the housing 12. In Figure 1, the legs 16 are shown in a folded condition, each leg 16 being received in a complimentary channel 18 over a portion of the length of the leg 16, with a lower or free end portion of the leg 16 extending out of the channel 18 to flank the spigot formation 14.

A pull tab 20 is defined by lines of weakness in a domed end 22 of the housing 12, remote from the spigot formation 14. The legs 16 are hingedly attached to the housing 12 just below the domed end 22. Free ends 24 of the legs 16 remote from the domed end 22 are flattened and sharpened in chisel fashion to facilitate insertion of the legs 16 into loose soil.

With reference to Figure 2 of the drawings, it can be seen that the booster pack feeding device 10 includes a booster pack 26 housed within the housing 12, more particularly within an operative lower portion of the housing 12 defining the spigot formation 14. The booster pack 26 may be entirely conventional or it may be adapted more specifically for use as part of the booster pack feeding device 10, as shown in Figure 2 of the drawings. In the embodiment shown in Figure 2 of the drawings, the booster pack 26 thus includes a bottom weight 28 of a material such as concrete and a pair of stabilising or guiding wings 30. A detonator 32 is located centrally and surrounded by an intermediary explosive charge 34 such as PETN or TNT, RDX, HMX or mixtures thereof. A pointed end of the booster pack 26 includes a temperature sensor 36.

The detonator 32 is connected to a signal transmission line 38 which is helically coiled inside the housing 12. The signal transmission line 38 is of a
predetermined length and may for example be in the form of a shock tube, a detonating cord, an electrical wire or an optical fibre. The signal transmission line 38 passes through a small aperture (not shown) in the housing 12 so that it is accessible from outside the housing 12.

As can also be seen in Figure 2, the booster pack 26 is connected to the pull tab 20 by means of an elongate connector 40 which ends in a safety or activation pin 42 which is inserted into the booster pack 26.

A small steam whistle 44 is located in the domed end 22.

The booster pack feeding device 10 is used in conjunction with a conduit 50 in a method of charging a blasting borehole in accordance with the invention. The conduit 50 is typically a PVC conduit with an internal diameter of about 75 mm and with a surface resistivity of less than $10^9$ ohm. A free end 52 of the conduit 50 is pushed tightly over the spigot formation 14 until the free end 52 abuts the upper portion of the housing 12 so that the booster pack 26 is aligned with a central longitudinal axis of the conduit 50. Typically, the conduit 50 has a length of at least six meters and is used in a blasting borehole with a depth of more than six meters. If desired however, two or more conduit lengths can be connected together, e.g. by means of a pipe joiner 51 (see Figure 3) or the like to extend the length of the conduit 50, e.g. to twelve meters. Instead, the conduit 50 may be a telescopic conduit so that the length of the conduit 50 can be increased by merely telescopically extending the conduit 50.

As shown in Figure 3 of the drawings, a lower end 54 of the conduit 50 is closed by a plug 56 with a tapered profile. The plug 56 preferably fits into or over the conduit 50 in a sealing manner so that in use flowable explosive does not enter the conduit 50.

Application of the booster pack feeding device 10 and a conduit 50 in accordance with a method of charging a blasting borehole according to the invention is illustrated in Figure 3 of the drawings. The booster pack feeding device 10 is used to position the conduit 50 in a blasting borehole 58 sunk for purposes of open cast coal mining. The blasting borehole 58 as illustrated has a depth of about ten meters and a diameter of about 100 – 350mm. The booster pack feeding device 10 functions as a
suspension formation or suspension device for suspending the conduit 50 inside the blasting borehole 58. This can conveniently be achieved by one of at least two ways. In one embodiment of the invention, the conduit 50 is connected to the booster pack feeding device 10 by pushing the free end 52 of the conduit 50 tightly over the spigot formation 14, where after the conduit 50 is fed into the blasting borehole 58 and the legs 16 are folded out as shown in Figure 3 of the drawings and the booster pack feeding device 10 is placed over a mouth 60 of the blasting borehole 58, with the conduit 50 thus suspended from the booster pack feeding device 10 and located co-axially with the blasting borehole 58. Instead, the conduit 50 can be inserted into the blasting borehole 58 manually by an operator and kept manually in position by the operator, where after the booster pack feeding device 10 is connected to the conduit 50 by pushing the spigot formation 14 tightly into the free end 52 of the conduit 50. The legs 16 are then opened and the booster pack feeding device 10 is supported on the soil surrounding the mouth 60 of the blasting borehole 58. Irrespective of which method is however used, the end result is that the conduit 50 is located co-axially with the blasting borehole 58 and suspended from the booster pack feeding device 10 which straddles the mouth 60 of the blasting borehole 58 by means of the unfolded legs 16.

Once the conduit 50 has been positioned inside the blasting borehole 58 and secured by means of the booster pack feeding device 10, the blasting borehole 58 is charged with a flowable explosive, such as ammonium nitrate fuel oil 62 shown in Figure 3. The charging of the blasting borehole 58 can be done in any convenient or conventional fashion, e.g. using a pump and a feed nozzle. If desired or required, the blasting boreholes can also be stemmed in conventional fashion.

The method of the invention can be used to charge a plurality of blasting boreholes with flowable explosive, with each blasting borehole having a conduit 50 suspended from a booster pack feeding device 10. As will however be appreciated, as the booster pack 26 is located inside the housing 12 at this stage, the booster pack 26 is not directly exposed to the conditions inside the blasting borehole 58 to which the flowable explosive 62 is exposed. Accordingly, even if a blasting borehole is hot, the booster pack 26 should not overheat and detonate prematurely as the booster pack 26 at this stage is still suspended above the flowable explosive 62. Even if the booster pack 26 detonates prematurely, as the booster pack 26 is located above the flowable explosive 62, the flowable explosive 62 should not detonate. Such a detonation of the
booster pack 26 should not be fatal to personnel in the vicinity of the hot blasting borehole.

When all of the blasting boreholes 58 in a bench to be blasted have been loaded with flowable explosive 62 (and stemmed if required), the pull tab 20 of each booster pack feeding device is manually pulled out of the domed end 22 and pulled upwards to pull the safety or activation pin 42 from the booster pack 26. As a result, the booster pack 26 is free to drop downwards into the conduit 50, to a predetermined depth determined by the predetermined length of the signal transmission line 38. As will be appreciated, this action can be performed quickly, thereby quickly completing the charging of all of the blasting boreholes 58 so that the blasting boreholes 58 are ready for detonation in a controlled fashion. The period of time during which a booster pack 26 is thus exposed to high temperatures which may exist in a hot borehole is thus limited.

If desired, prior to connecting the booster pack feeding device 10 to the conduit 50, water 53 can be poured into the conduit 50 so that the water has a desired depth when the conduit is operatively positioned inside a blasting borehole. In the event that a blasting borehole 58 is hot, the water will boil after a while and will generate steam. As the conduit 50 is open to the booster pack feeding device 10 via the spigot formation 14 so that the domed end 22 and the steam whistle 44 are in flow communication with any steam generated inside the conduit 50, the steam can reach the steam whistle 44 and can escape through the steam whistle 44. This will produce an audible, and to some extent also visible, warning that the borehole 58 is hot.

In order to detonate the booster packs 26, and thus the flowable explosive 62 in each of the blasting boreholes 58, the booster packs 26 are detonated in conventional fashion using the signal transmission line 38 of each booster pack 26.

As an added safety feature, the temperature sensor 36 in the nose of the booster pack 26 can be connected to a blasting borehole condition monitor 64 located externally of the blasting borehole 58. Communication between the temperature sensor 36 and the monitor 64 may be effected using the signal transmission line 38. Instead, a separate, second signal transmission line (not shown) may be employed. The second signal transmission line may, for example, also be coiled inside the housing 12, together
with the signal transmission line 38. In the event that the temperature sensor 36 senses a temperature which is dangerously high, the monitor 64 will provide a visible and/or an audible warning of the high temperature, e.g. as described in South African Patent No. 2010/01384.

As will be appreciated, instead of using a separate monitor 64, a blasting borehole condition monitor may be incorporated into the booster pack feeding device 10.

Conveniently, the booster pack feeding device 10 and a conduit 50 can be supplied as a booster pack feeding kit. The booster pack feeding kit may also include a blasting borehole condition monitor 64. The conduit 50 may comprise more than one separate conduit length, in which case the kit will typically also include a pipe joiner, such as the pipe joiner 51 shown in Figure 3. Alternatively, the conduit may be telescopically adjustable to obtain a desired length.

The method in accordance with the invention for charging a blasting borehole does not require a sophisticated booster pack feeding device 10 to work. Although the booster pack feeding device 10, as illustrated, is very convenient for functioning as a suspension formation or anchor formation to suspend a conduit 50 in a blasting borehole, other devices may also be used to suspend or anchor a conduit. Thus, as shown in Figure 4, a simple elongate body, e.g. a length of a metal or wooden bar or a length of a PVC pipe, indicated by reference numeral 70, can function as a suspension formation. The length 70 can be connected or attached to the conduit 50 in any convenient fashion. The connection may be as simple as the use of an adhesive tape or a cable tie or the like to attach the length 70 to the conduit 50. Instead, the length 70 and the conduit 50 can be pre-packaged and supplied together as a kit, together with a purpose-made connector for perpendicularly connecting the length 70 to the conduit 50.

In the embodiment of the method of the invention illustrated in Figure 4, a top cap 72 is used to close off the free upper end 52 of the conduit 50. If desired, the top cap 72 may include a steam whistle, such as the steam whistle 44. The top cap 72 may also define a receiving formation for receiving and supporting a blasting borehole condition monitor 64.
In this embodiment of the invention, the temperature sensor 36, when used, may be located in the plug 56 and may communicate with the monitor 64 by means of a signal transmission line 74.

The top cap 72 is removable. When all of the blasting boreholes 58 in a blasting bench have been loaded or charged with a main explosive charge 62, and there is no indication that any of the blasting boreholes 58 is dangerously hot, the top cap 72 on each conduit 50 can be quickly removed and a conventional booster pack 76 can be fed by means of the signal transmission line 38 to a desired depth inside the conduit 50, where after the top cap 72 is replaced, clamping the signal transmission line 38 in position between the top cap 72 and the conduit 50. Alternatively, the booster pack 76 can be preloaded into the conduit 50 with the signal transmission line 38 extending through a small aperture in the top cap 72. In this embodiment of the invention, feeding of the signal transmission line 38 into the conduit 50 is restrained until the time has come to drop the booster pack 76 to a desired depth inside the conduit 50.

Also with the embodiment of the method of the invention shown in Figure 4, the use of water 53 inside the conduit 50 is optional.

It is to be appreciated that a booster pack feeding device in accordance with the invention, and which is positioned above the conduit 50 but not attached to the conduit 50, can also be used to feed a booster pack into the conduit 50. Such a booster pack feeding device can be supported over a mouth of the conduit 50, e.g. by means of legs such as the legs 16. The booster pack feeding device in this embodiment of the invention acts as a carrier for the booster pack and as an anchor from which the booster pack can be lowered into the conduit 50, without being attached to the conduit 50, and thus without also acting as an anchor or suspending formation for the conduit 50.

The method of the invention, as illustrated, and the booster pack feeding device and booster pack feeding kit according to the invention, as illustrated, provide increased safety for personnel involved in the loading or charging of blasting boreholes which may be hot. With the method of the invention, it is possible to delay the positioning of a booster pack inside a borehole filled with a main explosive charge until very close to the time when controlled detonation of the blasting borehole is planned.
As a booster pack can be loaded into the blasting borehole very quickly using the method of the invention, it is possible for personnel involved in the positioning of the booster packs to leave the vicinity very quickly. Premature detonation under extreme condition should thus not be fatal as all personnel should be away from the blast area or bench shortly after the booster packs have been loaded into the blasting boreholes. Advantageously, existing booster packs can be used in the method of the invention although the use of a booster pack feeding device which includes a purpose made booster pack is expected to be very convenient and further to shorten the time required to fully prepare a blasting borehole for controlled detonation.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method of charging a blasting borehole, the method including
   submerging a lower portion of a conduit in a main explosive charge in a blasting
   borehole such that an upper portion of the conduit is exposed;
   preventing ingress of the main explosive charge into the conduit;
   filling the conduit at least partially with water, so that in the event of a hot blasting
   borehole, sufficient vapour produced by heating of the water in the hot blasting borehole
   can escape from an upper end of the conduit to provide a visible and/or audible signal,
   and the water assisting in limiting temperatures inside portions of the conduit below the
   surface of the water to the boiling temperature of the water; and
   feeding a booster pack into the conduit so that the booster pack is suspended
   inside the conduit at or below an upper surface level of the main explosive charge in the
   blasting borehole and submerged under the water.

2. The method as claimed in claim 1, in which the conduit is of a material, or
   is treated with an anti-static agent, such that the material or anti-static agent provides
   the conduit with a charge decay half life of static charge of less than 1 second.

3. The method as claimed in claim 1 or claim 2, in which the conduit exhibits
   a surface resistivity of less than $10^9$ ohms.

4. The method as claimed in any of claims 1 to 3, which includes suspending
   the conduit from a suspension formation over a mouth of the blasting borehole.

5. The method as claimed in claim 4, in which the suspension formation
   includes a housing or anchor body and at least one support member to support the
   housing or anchor body over a mouth of the blasting borehole and with the conduit in
   use suspended from the housing or anchor body.

6. The method as claimed in claim 5, in which the housing initially houses or
   carries a booster pack and an elongate flexible member connectable or connectible to the
   booster pack, and in which feeding a booster pack into the conduit includes lowering the
booster pack from the housing downwards into the conduit by means of the elongate flexible member.

7. The method as claimed in claim 3, in which the conduit exhibits a surface resistivity of between 100,000 ohms and 50x10⁶ ohms.

8. A booster pack feeding device for feeding a booster pack into a conduit of which a lower portion is submerged in a main explosive charge in a blasting borehole with an upper portion of the conduit being exposed, the device including
   a housing releasably housing or carrying a booster pack, the housing being connectable to said upper portion of said conduit;
   an elongate flexible member connected or connectable to the booster pack, the elongate flexible member being coiled or wound inside the housing;
   a whistle on the housing, the booster pack feeding device including or defining an opening which in use is in flow communication with said upper portion of said conduit and said whistle being in flow communication with said opening;
   at least one support member to support the housing over a mouth of the blasting borehole, the at least one support member being displaceable between a retracted or folded condition and an extended or unfolded condition; and
   a connector to connect said upper portion of said conduit to the housing.

9. The booster pack feeding device as claimed in claim 8, which includes a release formation for the booster pack, the release formation being configured on activation to release the booster pack from the housing so that the booster pack is lowered or drops down a conduit in use connected to the housing.

10. The booster pack feeding device as claimed in claim 9, in which the release formation is in the form of an activation pin which is pulled from the booster pack, activating the booster pack for detonation and releasing the booster pack from the housing.

11. A booster pack feeding kit which includes
   a booster pack feeding device as claimed in any of claims 8 to 10; and
   a conduit connectable to the booster pack feeding device.
12. A booster pack feeding kit as claimed in claim 11, in which the conduit is of a material, or is treated with an anti-static agent, such that the material or anti-static agent provides the conduit with a charge decay half life of static charge of less than 1 second.

13. A booster pack feeding kit as claimed in claim 10 or claim 11, in which the conduit exhibits a surface resistivity of less than $10^9$ ohms.

14. A booster pack feeding kit as claimed in claim 13, in which the conduit exhibits a surface resistivity of between 100 000 ohms and $50 \times 10^6$ ohms.

15. A booster pack feeding kit as claimed in any of claims 11 to 14, in which the conduit is an antistatic PVC conduit.