



Pantonite™ PM77

Dilute Acid Material with Additives

The Cleaning and Disinfection of

WELLS and MEDIA

Product Manual

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September 2018

PM77

Borehole

Cleaner and Disinfectant

1. General Description

Feature

- 1.1 **Pantonitetm PM77** is a mixture of organic and inorganic acids with additives which dissolve complex biofouling encrustations formed by chemical and bacterial action on a range of dissolved metal ions in the water, amongst which are iron, manganese, calcium and similar.
- 1.2 **PM77** is NSF, Section 60 Certified for use in drinking water.
- 1.3 **Safe to use: PM77** action does not produce volatile reactions or dangerous volumes of gas. It does not develop pressure within the borehole and requires only normally recommended protective personnel safety apparel for handling and usage.

PM77 will not damage borehole pumps or fittings during normal use.

- 1.4 **Disposal: PM77** needs only pH neutralization to be safe for controlled disposal to the environment (refer section 2.5 below).

However, consideration must be given to the waste products of the cleaning and disinfection process which will be in solution and suspension during flushing and washing out of the borehole.

1.5 Background Technology

The commonest type of clogging and fouling in wells arises from ferrous, manganous and calcareous incrustations and similar

biofouling which impede the free flow of water into the casing. This problem has physico-chemical and biological origins.

Clogging begins when dissolved substances in the water oxidize and form deposits in the water-bearing strata of the aquifer, the gravel filter layers and the filter pipe itself.

But, additionally, biological activity is an even greater evil.

Bacteria take nourishment from dissolved ions in flowing groundwater, typically iron, manganese and calcium.

The bacteria are immobile and a high volume flow of water towards the well plays an important part in their nourishment, greatly enhancing the growth of fouling.

In time, the necrosied bacteria leave behind the ingested metals providing a base for new cultures to form and creating a cycle leading to a steady build-up on all surfaces.

These complex processes cause an inexorable blocking of the water channels leading to the borehole pump. The yield of the borehole drops steadily towards an unacceptable level.

PM77 breaks down a wide spectrum of deposits and encrustations, providing the total removal of all fouling and the restoration of flow to the pump.

In contrast, single component treatments such as pure hydrochloric acid, chlorine or hydrogen peroxide tend to be selective in their reactions and therefore only partially effective in restoring the yield of a borehole.

PM77 is also a powerful disinfectant. No live bacteria are left within the treated environs of the borehole at the completion of cleaning.

2. *Application Procedure*

2.1 **Method Statement**

Any simple method by which **PM77** can be introduced into the standing water of a borehole **in even concentration** is acceptable. Typically employed is pumping or pouring, down a simple weighted plastic hose-pipe (say), starting at the greatest depth and drawing upwards at a steady rate to achieve the specified concentration (see below) in the borehole water, at all levels.

The rate of withdrawal may be varied at certain depths if greater volumes of **PM77** are required at (say) the in-flow/gravel pack level to permit effective treatment outside of the casing as well as within.

Also, regions of greatest encrustation should receive greater concentrations of **PM77**.

These factors are site specific.

Preparation

PM77 components should be mixed in solution on the surface prior to introduction to the borehole. For every 1 gallon use of PM77, 0.4-0.5 lbs. of PM100 powder must be added to activate the solution.

For every 5 Gallons of PM 77, 2 lbs. of PM 100 should be mixed. In a 55 gallon drum of PM77, 22 pounds of powder (PM 100) must be added.

Dissolve **PM100** powder directly into the liquid in the **55 Gallon** drums. This procedure does not produce any reaction and is only necessary due to the short shelf life (i.e. days) of the mixed product.

Sets of chemical pumps and hosing specifically designed for this work are available for purchase or hire.

Concentration within Borehole

For effective treatment, the ratio of **PM77** to water by volume must be:

**1 – to - 4
by volume**

Simply, calculate the **approximate wetted, internal volume of the screen casing** under standing water conditions. The **quantity of PM77 to be used is 25%** of this volume of water.

2.2 Residence Time

The **PM77** solution should be left in the borehole for a residence time of **16 hours**.

2.3 Mechanical Cleaning/Agitation

PM77, dissociates naturally into the borehole water and does not require any particular mechanical agitation or assistance to penetrate all parts of the borehole to effect the full treatment of all contaminated regions.

However, gentle brushing or mechanical agitation may assist the rate of distribution and penetration of **PM77** material, particularly if applied in the latter half of the residence period.

Caution:

Excessive or early mechanical brushing or agitation is discouraged as damage to badly corroded or delicate casings can occur and **PM77** material can be forced out into the aquifer strata beyond where it is actually required and thus wasted.

Note: Aquifer Pollution.

While all components of PM77 solution are readily biodegradable and are incapable of adding any permanent toxicity, taste or pollution of any sort to the water within the aquifer or borehole, it is undesirable to encourage any products of the removed incrustations and fouling out into the aquifer by excessive mechanical action.

2.4 **Pumping/Mucking out**

At the end of the treatment period a temporary borehole pump or airlift may be installed and pumping of water and **PM77** solution from the borehole may begin.

If required, the permanent pump may be re-installed and used. While it is unlikely to be damaged by **PM77** solution, solid fouling in suspension and dissolved contaminants could cause harm.

The effluent should be pumped into a suitable sized settling tank (i.e. 5m³ to say 10m³ in volume) pH neutralized (see 2.5) and allowed to settle in the tank as much as possible before allowing clear, neutral water to flow over onto the ground.

Extraction should continue until the pH of the water exiting the borehole as well as all discoloration and suspended solids (if any) have reduced to normal levels.

All products associated with the cleaning and disinfection process will have been removed from the borehole once the pH has returned to normal for the borehole and the water is visually clear. Formal tests should be taken to verify suitability for use as required.

2.5 **Neutralization and Disposal**

Each 55 Gallons of **PM77** is supplied with 22 Lbs. of neutralizer powder. As required, **neutralizer** may be added to the discharge water in the settling tank.

This will rapidly neutralize the pH of the discharge water, as required.

Ideally, do not place the neutralizer directly into the borehole in particular, before the end of the 24 hour residence period.

PM77 material, once pH neutralized can **normally be disposed of directly to the environment**, subject to EPA approval.

Caution:

The products of the cleaning process in the discharge water, both dissolved and solid, need specific consideration for disposal.

This is site specific and cannot therefore be commented on in this document!