Reuven A Reshef

BERMAD CIS Ltd

Reuven_r@bermad.com

www.bermad.com

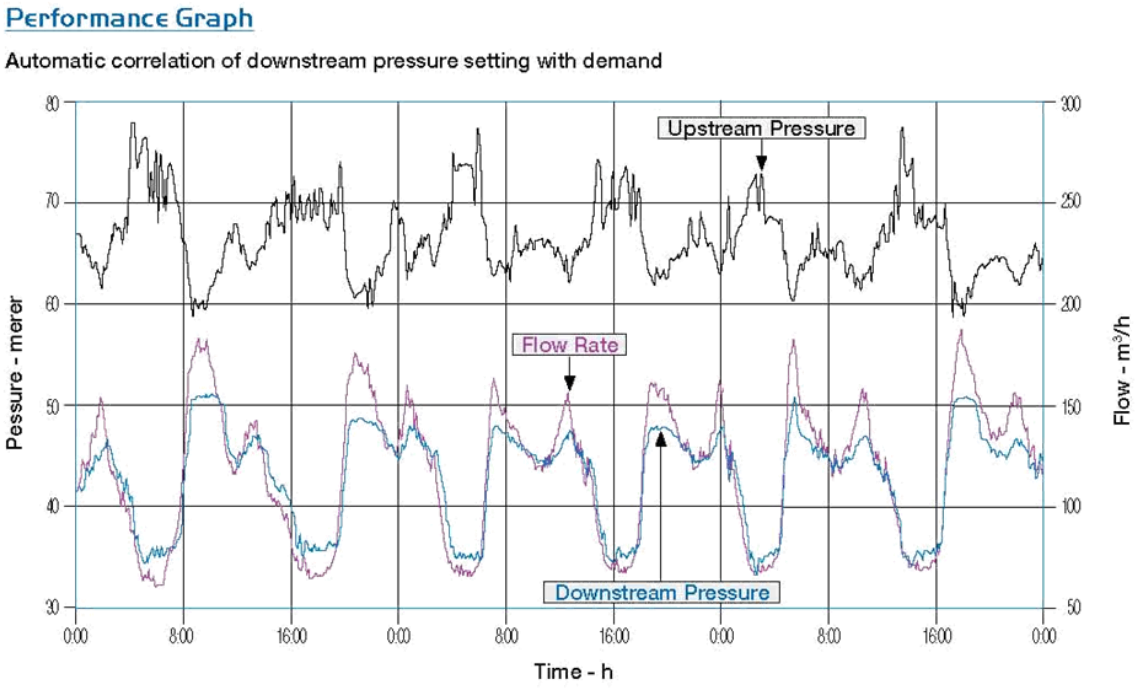
**PRESSURE MANAGEMENT** in **VERY LOW PRESSURE ZONES**

## 1. *General*:

- The most acceptable method of applying **Pressure Management** in Pressure Zones is regulating the zone pressure in accordance with the demand or flow in the zone.
- This method of **Dynamic Pressure Management** is based on the assumption that during most of the time there is access pressure in the system which can be reduced to the minimum pressure still ensuring sufficient pressure for the most inferior client in the zone.
- By this we may reduce the **NRW** due to **leaks and bursts** to an acceptable minimum while insuring that in cases of high demand, the pressure in the system will raise to ensure sufficient needed pressure in the zone (during day time or – for example –during fire emergency demand at night).

This **Dynamic Pressure Management** is achieved mainly by using **Pressure Reducing Valves** controlled by deferent controllers, electronically, electrically or mechanically operated.

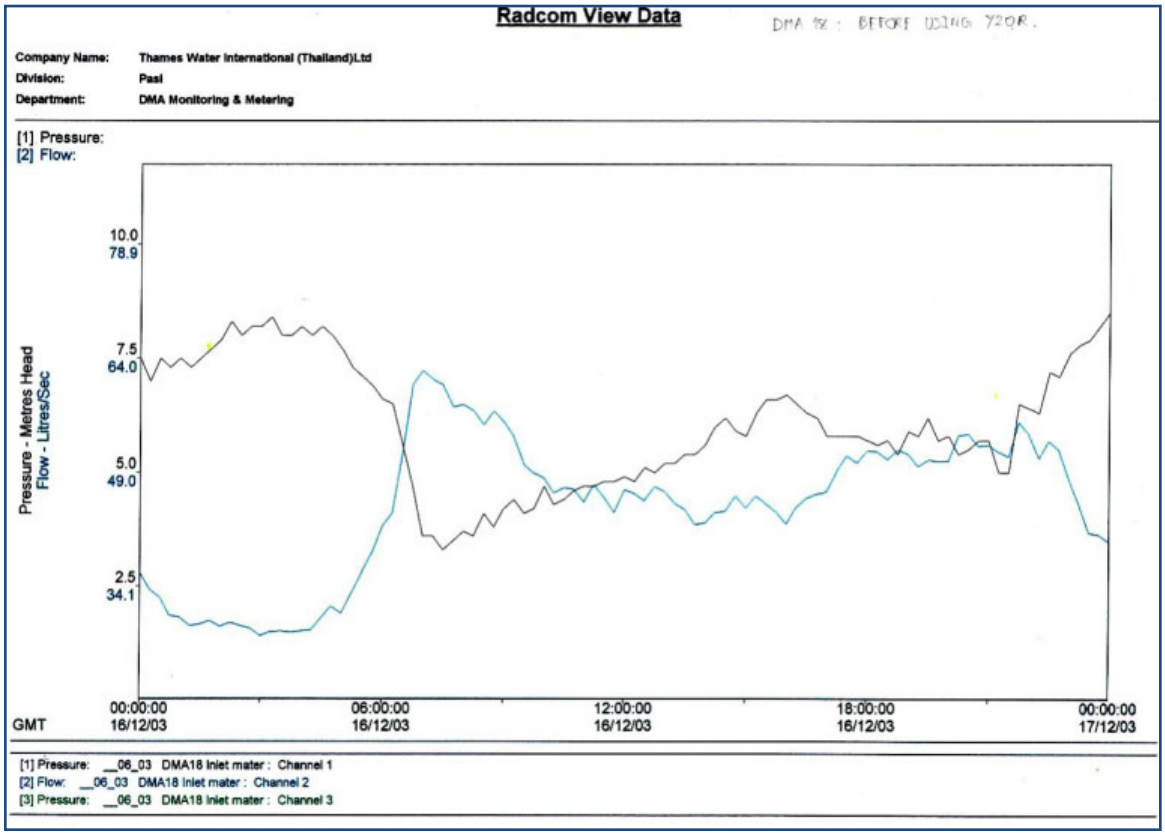
**Figure 1.1: Typical Dynamic Pressure Management**




## 2. Very low pressure zones:

- In some Pressure Management projects done recently, a different situation emerges which requires a different approach.
- Instead of the usual flow pattern we are used to see, the flow characterize is more of a 2 stage pattern with a rapid change and not at times we use to see in Europe.

**Figure 2.1: Low Pressure Zone without PRV**
**typical Day / Night Flow and pressure**




- During high flow demand (day time) every meter water column of pressure counts and the system cannot tolerate any head lose across its regulating device.
- During low demand, (night time) the pressure in the system can be reduced, but only by a very small percentage - WCM.
- Even here, while fighting to reduce NRW leaks and bursts, every meter counts.

In some cases it is problematic to use electrical power.
See picture 2.2 of a typical manhole.

**: A typical manhole.**

## 3. The Challenge:

Some quotes from the ADB (Asian Development Bank) report on NRW:

**Table 3.1: ADB report on NRW**

Pressure management is also the only element that can shrink (or expand) the small box, which represents the minimum achievable volume of physical losses. In the past, pressure reduction was only considered in systems with excessively high pressures. Presently, pressure management is considered essential to sustain leakage reduction efforts, especially in deteriorated distribution networks with relatively low pressures. For example, in a system with an average pressure of only 15 m (not uncommon in Asia), a 3 m pressure increase (which will hardly be noticed) will increase the volume of leakage by 20%. In addition to having an immediate positive impact on the volume of water lost, pressure management will also dramatically reduce burst frequency and therefore extend the lifetime of assets and reduce repair and maintenance costs.

**Table 3.2: ADB report on NRW (continue)**

Pressure management in its simplest form requires zoning by elevation, but the trend is towards more sophisticated pressure management, where marginal pressure reductions and the avoidance of pressure fluctuations are the main objectives. This trend is relatively new and hence there is a substantial lack of

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Pressure management requires a lot of expertise

**Table 3.3: ADB report on NRW (continue)**

| ges of Reducing Non-Revenue Water |
| --- |
| understanding in water utilities around the world. Therefore, specialized outside advice will often be required when a water utility starts to engage in pressure management. While there is an initial technological barrier to overcome, advanced pressure management will play an important role in solving Asia's massive leakage problems. |

## 4. The solution:

- A Pressure Management system which is fully open with no head loss during high demand, reducing pressure during low demand, while insuring quick opening in case of sudden high demand (like fire protection).
- All operated by a mechanically device without any electrical power.

**Figure 4.1: Case Study Bangkok**

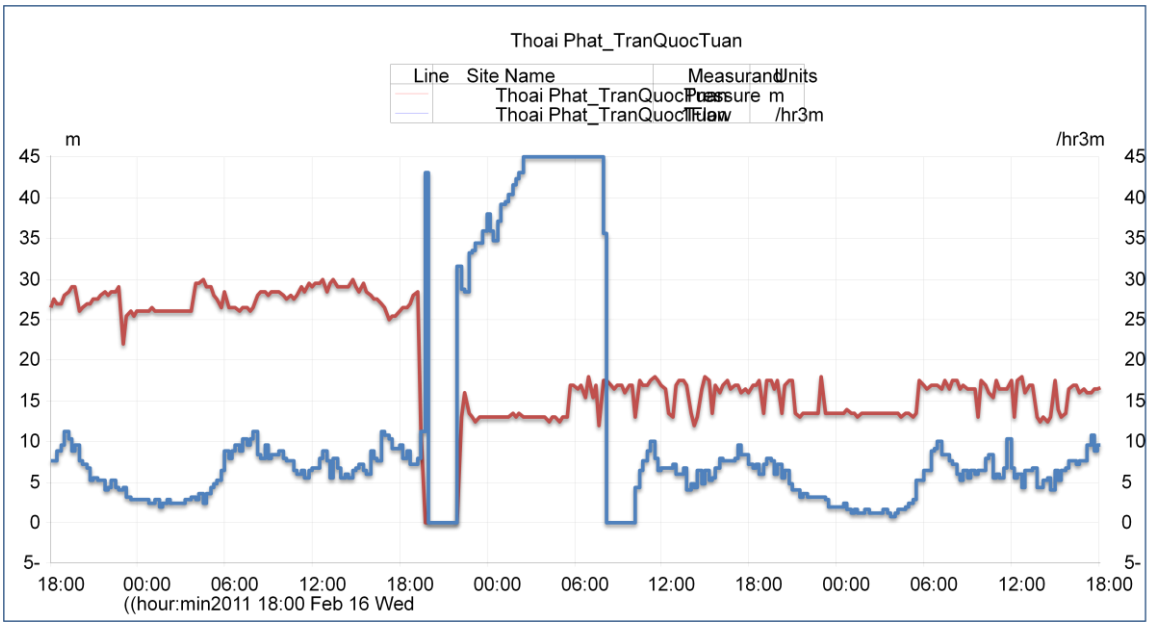
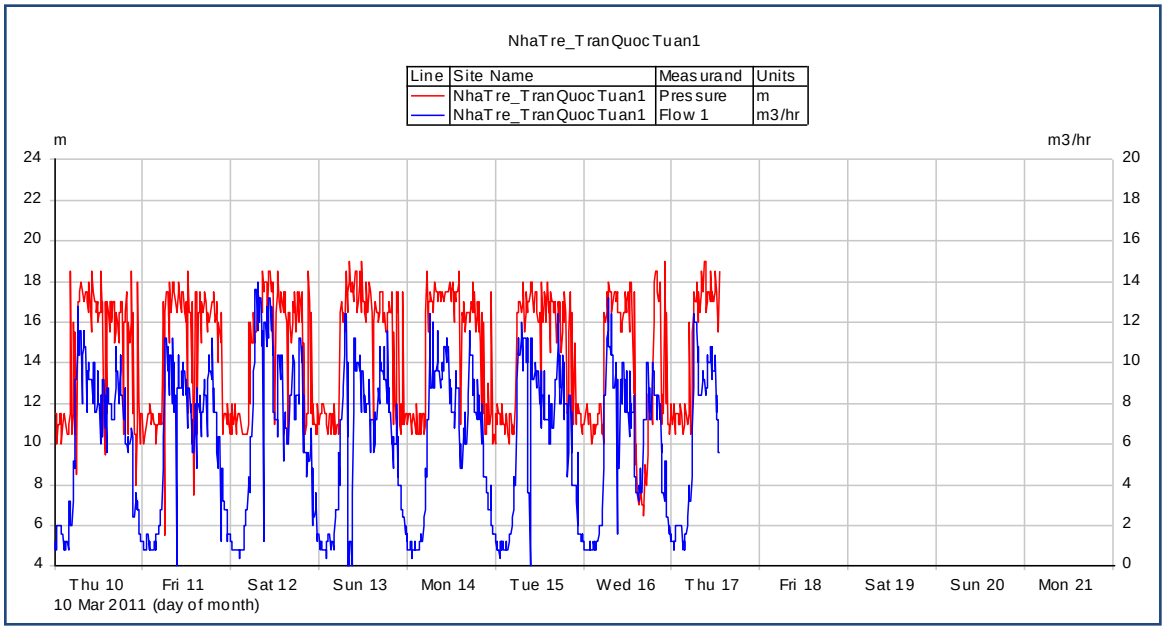


**Figure 4.2: Case Study PHU THU VIETNAM**

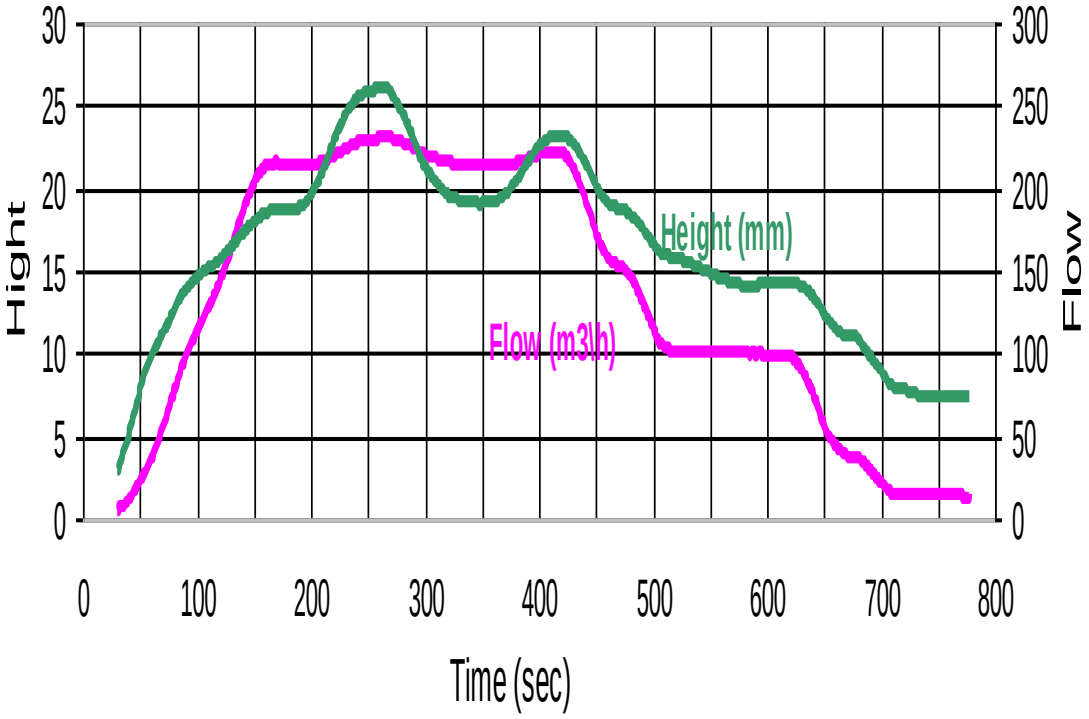

**Figure 4.3: Case Study HO CHE MEAN City**



## 5. The system:

The BERMAD 7PM is a full dynamic modulation, flow compensation, self contained hydro mechanical pressure reducing valve.
The system uses the valve position (a direct indication of the flow) to modulate pilot setting.

**Figure 5.1: The connection between valve indication (opening) and flow**




Downstream pressure setting is automatically optimized by variation of demand.

**Figure 5.2: Model 7PM performance graph – connection between flow and downstream pressure**

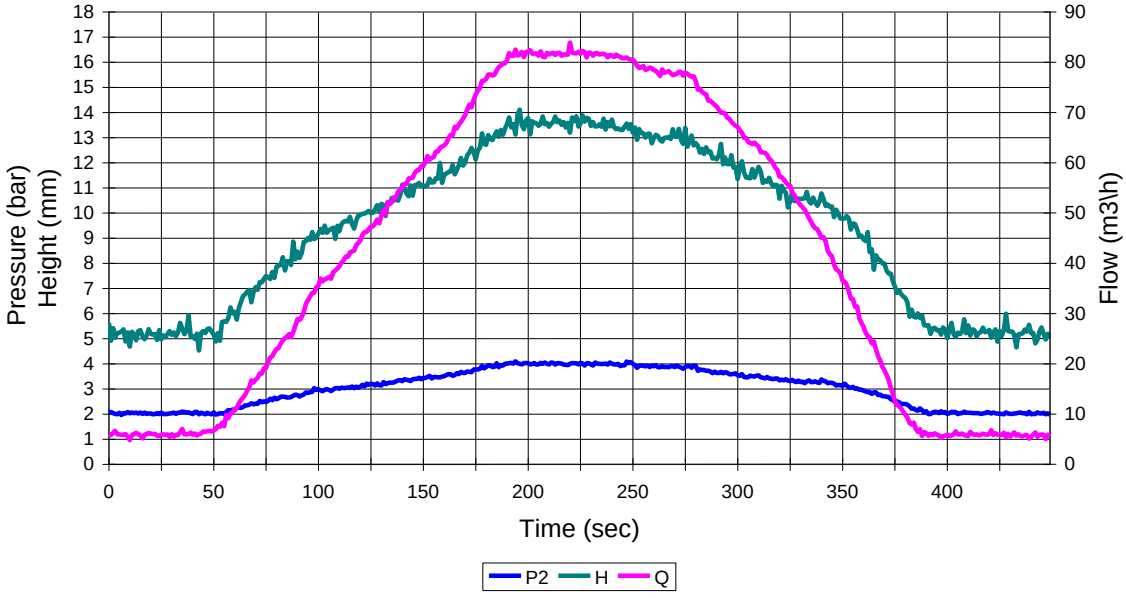


**Figure 5.3: Performance graph (Scotland)**

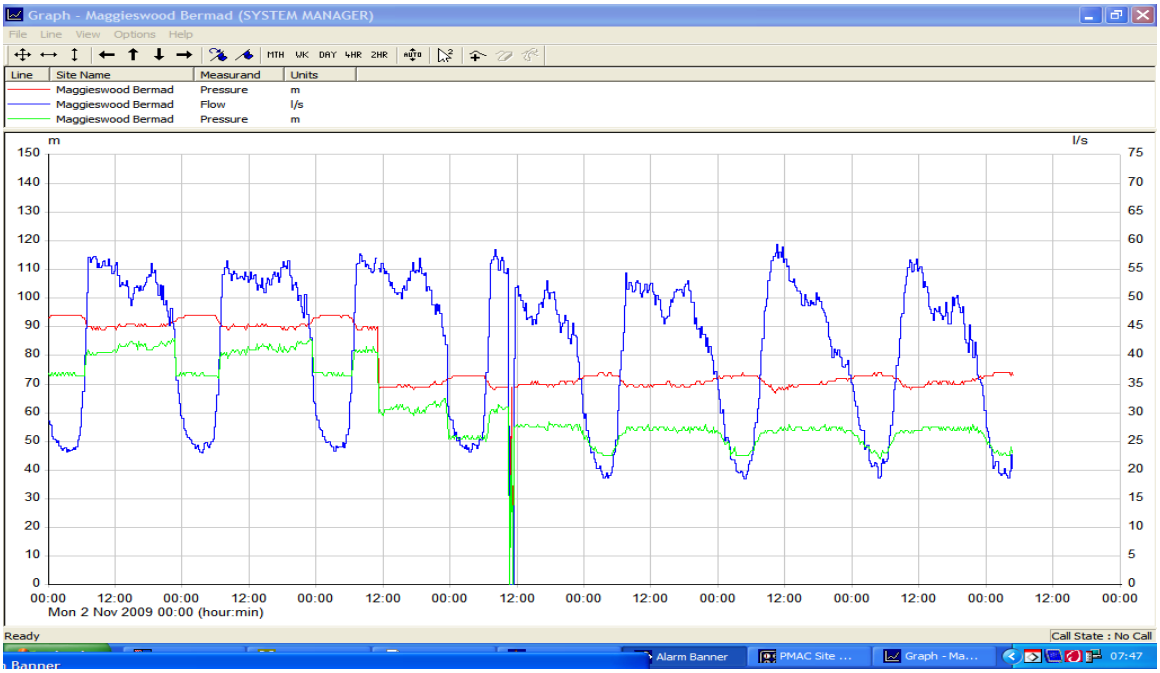
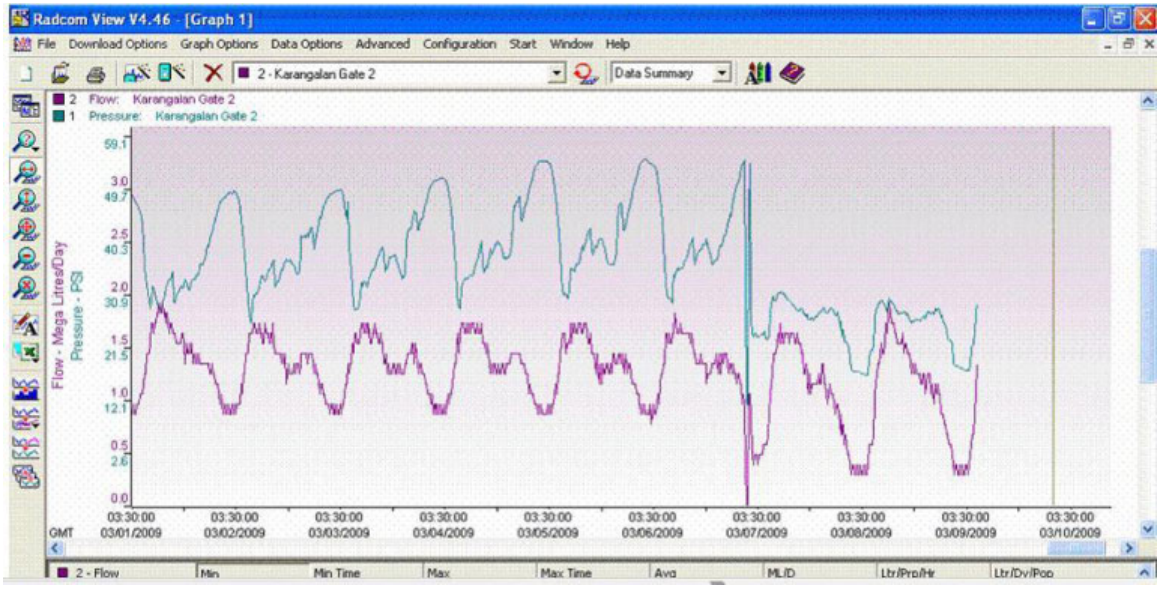



**Figure 5.4: Performance graph (Bangkok)**
**Please note quick commissioning and immediate night flow reduction (reduced leakage)**



## 5.1 Advantages:

- Self containing operation – no need for any power supply
- Adjustable minimum low pressure.
- Adjustable maximum high pressure.
- Quick respond to change in demand (critical in emergency situation).
- Maximum saving in NRW day and night.
- Works in low pressure and low differential zones.

**Figure 5.5: the BERMAD 720-7 PM- ES Valve**