

**Submission to the Commission of Inquiry on the January 2011 Queensland Floods**

**Issues addressed:**

- preparation by federal, state and local governments, emergency services and the community
- measures taken to protect private and public property
- measures to manage the supply of essential services

**Summary**

The following is a submission to the Commission of Inquiry on the January 2011 Queensland Floods that highlights technologies to assist communities and emergency services with preparedness, response and recovery to natural disasters such as floods.

Other countries throughout the world have already embraced these technologies to support flood mitigation efforts of their citizens and civil defense organizations.

With climate change a reality, our state emergency services feel the duty to investigate and trial these technologies, new to Australia, yet field-proven overseas for some years now.

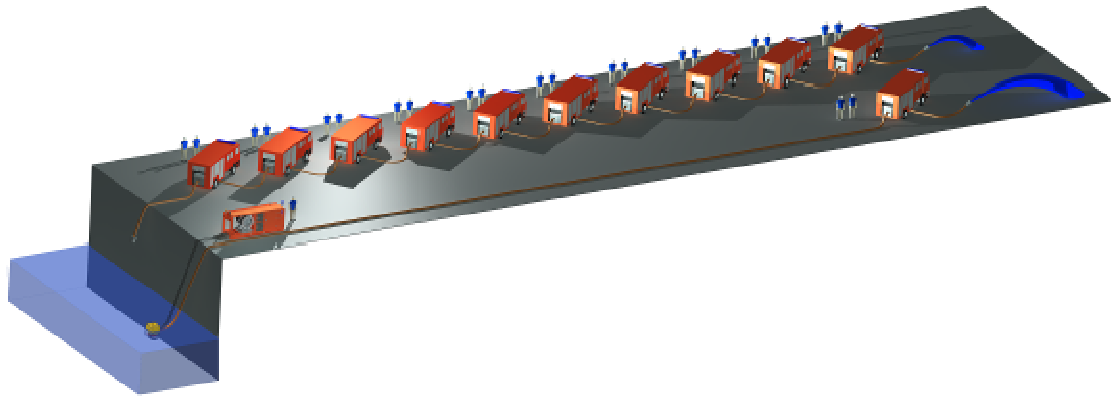
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**HIGH VOLUME PUMPS**

**SYSTEM DESCRIPTION**

An enhanced pumping capability, i.e. the capacity to quickly pump large amounts of water over large distances, is necessary in various man-made or natural disasters like:

- o large-scale fires (industrial estates, factories, warehouses, refineries and tank farms),
- o floods (to dewater flood-affected areas, dams),
- o earthquakes (to fight fires following earthquakes despite a damaged fixed underground fire water system),
- o to bring drinking water to townships, etc...



Australian fire brigades' main pumping capability to date is their fire appliances with their onboard pumps. Traditionally adequate for house fires, it reaches its limit for larger fires.

As described in the above diagram, carrying large amounts of water over large distances using fire trucks has several major drawbacks:

- Suction limits access to open-water sources
- Relay-pumping uses 1 truck every 250m hence mobilizes valuable equipment and manpower
- Relay-pumping takes a long time to set up
- Small size hoses and associated friction loss limit water flow and pressure

All these mission-critical limitations are resolved with a mobile High Volume Pump system.

- No draft problem thanks to hydraulically-driven portable submersible pumps
- Large diameter hoses limit friction loss therefore allow to pump high flow of water at high pressure over kilometers
- Time and manpower needed for deployment is cut to a minimum
- The recovery of large diameter hose is mechanized



Diesel-engine driven hydraulic Power Pack    Hydraulically-driven portable submersible pump



Mechanized large diameter hose recovery unit



Fast hose laying

Furthermore a mobile High Volume Pump system, like the HYTRANS system, is containerized, to be deployed by a hook lift truck. Thus it can be another module for Australian Fire Brigades' pod systems.



Deployment by hook lift truck

### **Versatility**

The HYTRANS mobile High Volume Pump system is powered by a diesel-engine driven hydraulic power pack. A HydroSub150 Power Pack can hydraulically drive:

- 1 pump delivering
  - o 3500L/min at 10 bar with a standard impeller
  - o 8000L/min at 2 bar with a high flow impeller
- 3 manifolded flood pumps delivering 45000L/min at 0.6 bar
- a 38kVA generator
- a 120m<sup>3</sup>/h Positive Pressure Ventilator

## REFERENCES

### - **New Dimension Programme (UK)**

The New Dimension Programme was established by the Office of the Deputy Prime Minister of the United Kingdom following the September 11 2001 attacks. Its aim was to build resilience and enhance the capability of the country's Fire and Rescue Service to respond to a range of incidents, including natural disasters such as floods and earthquakes.

Under that program, in 2004, 50 High Volume Pump sets were purchased to equip all UK Fire and Rescue Services.

The most notorious deployment of HVPs in the UK is when 14 of them were pooled to get the December 2005 Buncefield tank farm fire under control. That was the largest post-World War II fire in Europe.

In a statement by the Deputy Prime Minister to the House of Commons in February 2006, one can read:

"I am pleased to tell the House that the high-volume pumping equipment, which was used so effectively in the Carlisle floods in January (ndlr 2005), has again proved vital. Just one of those high-volume pumps does the work of 18 traditional fire engines and it can pump water over a distance of some three miles. The new equipment was provided by my Department under the New Dimension programme for precisely those kinds of major emergencies."

HVPs were also deployed by the UK Fire & Rescue Services during the nationwide floods of summer 2007 that killed 13 people. See photos below.

# Fire Fighting Technologies

Fire Fighting Technologies International Pty Ltd



- **In our region**

Neither Australia nor New Zealand has equipped its emergency services with HVP yet. Some Fire Authorities are still trying to obtain funding from their respective state government and have been doing so since a successful series of demonstrations in September 2005 in the Australian eastern states, where the concept of HVP was accepted.

However other countries in our region have in the meantime already adopted this technology:

- Malaysia - 10 x HS150 units
- Japan - 1 x HS900 + 6 x HS150 + 8 x HS60 or 15 units
- Singapore - 2 x HS150 units
- Indonesia - 6 x HS150 + 3 x HS60 or 9 units
- Thailand - 5 x HS150 units

- **In Queensland**

The Queensland Fire and Rescue Service has identified as possible uses for HVPs in QLD, the following:

- Supply large amounts of water to fire appliances and monitors (i.e. water cannons) during large-scale fires (80% of Brisbane Major Hazard Facilities are located East of the Westgate Bridge)
- Establishing water refill stations for pumpers/helicopters during bushfires
- Dewatering flood-affected areas to assist communities with recovery
- Dewater critical infrastructure (eg. 20/11/08: Brisbane's Inner City Bypass flooded after system fault)
- Transfer of drinking water from train to township reservoir
- Empty a dam to avoid overtopping during a storm (eg. 28/05/10: NSW Bulli Dam)

That Fire Authority aware of a gap in its pumping capability shall seek funding for the coming years for a number of units to be pre-positioned around the state.

## FLOOD BARRIERS

### **DESCRIPTION**

There are different types of flood barriers:

- fixed (levees, dykes, etc...)
- temporary/mobile (resting on the ground)
- demountable (a fixed structure (eg. doorframe) holds the barrier)

Educational reading on comparative studies available in the public domain includes:

- Advisory guide to temporary mobile flood protection (systems for use in emergencies) by the Association of Cantonal Fire Insurers and the Swiss Federal Office for Water and Geology (Switzerland - March 2004)
- Temporary and Demountable Flood Protection under the Flood and Coastal Defence R&D Programme by Department for Environment, Food & Rural Affairs and the Environment Agency (UK- 2002)

Swiss company BEAVER AG manufactures a water-filled twin-tube mobile flood barrier ideal to hold back or divert flood waters. Switzerland, because of its steep terrain, is prone to a lot of flash floods in spring.

“Inflatable (water or air-filled) tubular geomembranes, have the widest possible area of application: in urban and rural areas, almost without restrictions regarding the relief and underlying soil, with the fastest installation time and least requirements regarding the equipment. They are very good as closure structures for still and slowly flowing water, up to 1.5m high.”

*Extract from report “Alternatives to sandbags for temporary flood protection” from the Alberta Transportation and Utilities / Disaster Services Branch and Emergency Preparedness Canada*



Mobile flood barriers are traditionally used to hold back flood waters or to divert them away from an area to be protected (building (eg. hospital basement and its mission-critical services), CBD (eg. main shopping centre)).

## REFERENCES

### - **Swiss Civil Defense**

Because of its steep terrain, Switzerland is prone to flash floods. For that reason, the Swiss Federal Office for Civil Protection has adopted and equipped itself with not only High Volume Pumps but also water-filled mobile flood barriers, both being supplementary. The photo below shows operators' training in winter conditions.



### - **Emergency Management Queensland**

Late 2008, the QLD Ministry for Emergency Services announced its intention to purchase flood barriers but the concept was an emerging one and no concept of operations had been written at the time, yet EMQ purchased the same type of flood barriers it had borrowed early 2008 from NSW SES and still has a Standing Offer Arrangement with the supplier of that particular type of flood barriers.

As different types of temporary mobile barriers cater for different applications (see reports recommended above), we question the soundness of the decision of standardizing on one type only and recommend that a more in-depth analysis of needs and solutions concerning flood barriers be undertaken.



## **SELF-INFLATING “SANDLESS” SANDBAGS**

### **DESCRIPTION**

Since the 2005 Carlisle and the Summer 2007 floods in the United Kingdom, several companies have developed, manufactured and commercialized self-inflating “sandless” sandbags, seen as a good supplement to traditional sandbags, so that local residents can enhance their preparedness whilst reducing the demand on public services at times of floods.

UK company AET Ltd manufactures the patented AQUA-SAC<sup>®</sup> self-inflating “sandless” sandbag. This flood defence tool, compact when deflated, with a 5-year shelf life, inflates in 3 to 5 minutes in contact of fresh water. It can be easily stored and transported.

With the same dimensions as a traditional sandbag but half the weight then inflated, AQUA-SAC<sup>®</sup> can be stacked to protect buildings’ entryways.

Australian councils can implement initiatives to encourage residents to be better prepared and reduce demand on council and SES resources.



### **REFERENCES**

- **UK North East Regional Flood Rescue and Damage Prevention Project**

The Project provides the North East region of the UK with a flood rescue response module that delivers a self sufficient capability to deal with rescues and assist local communities in their flood damage prevention efforts.

The four Fire & Rescue Services involved:

- equipped 5 swift water rescue teams
- equipped 10 first responder teams
- provided additional equipment for the 3 HYTRANS High Volume Pumps stationed in the North East region
- established a regional stock of “alternative sandbags”

AQUA-SAC<sup>®</sup> was selected as the “alternative sandbag”. The regional stock being containerized can be mass deployed 24/7 to flood areas. Used in similar ways to an ordinary sandbag, the great advantage of “alternative sandbag” is that they are pre-filled, much lighter and easier to store than conventional sandbags.

These “alternative sandbags” are distributed by the Local Authority to residents in need. The Local Authority pays for the replacement of any bags used in order to maintain the Mutual Aid Stock.

- **The Mackay Regional Council 2009 initiative**

During the past 2009/2010 wet season, the Mackay Regional Council launched an innovative and proactive initiative to increase the level of preparedness and self-reliance of its residents during the cyclone season.

A simple and effective way to ensure residents are ready also means that demand on council and SES resources is reduced, especially as these are often tied up filling and distributing sandbags to the community at the most critical time of a flood or a cyclone event, when they have so much more to do.

The Council endorsed a rebate system whereby self-inflating “sandless” sandbags, like the AQUA-SAC® brand, purchased by residents at local hardware stores attracted a partial subsidy paid by the Council on presentation of a proof of receipt and evidence of residency within the Council area.

Light, compact and with a shelf-life of 5 years, AQUA-SAC proves to be a neat solution for Mackay residents when dealing with flooding issues.

Such a proactive initiative can easily be replicated by other Councils facing similar flood and/or cyclone issues.

and also....



**FLOOD BROCHURES AND WEBSITE PAGES**

Neither flood brochures printed by Federal government (EMA) or emergency services (VIC SES, NSW SES) nor websites' pages on flood (see <http://www.emergency.qld.gov.au/emq/css/flood.asp> or <http://www.ses.nsw.gov.au/community-safety/floodsafe>), mention the existence of flood response equipment meant to enhance the self-reliance and preparedness of residents, hence lessen the burden on the emergency services' resources during natural disasters.

We understand that of course no particular products can be endorsed but product types such as self-inflating sandless sandbag and flood barriers (either mobile or demountable) should be mentioned. Thus residents in flood-prone areas can make an informed decision on whether they want to be entirely reliant on external assistance or not.

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We believe that the products above can assist Queensland in the future to better prepare for and respond to floods, just as has been the case in so many other countries. We like to further explain this to the Commission in person and therefore ask the Commission to be heard.

I remain at your disposition, should you have any questions.

Regards,

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Sales and Marketing Manager

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