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System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts unbiased operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

Information provided by the SAVER Program will be shared nationally with the responder community providing life- and cost-saving assets to federal, state, and local responders.

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

For more information on this and other technologies, please see the SAVER Web site or contact the SAVER Program Support Office.

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SPAWAR



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TechNote

Portable and Mobile Pumps Used for Flood Management

Background

Flooding can occur for a number of reasons, including storm surges, heavy rains, snowmelt, ice-jams, and failure of water control infrastructures, such as storm water systems, levees, and dams. Portable and mobile pumps are not a substitute for proper flood control infrastructure design and advance mitigation of flood hazards, but they can sometimes be used to assist drainage and removal of water when flooding does occur.



Portable and mobile pumps are used for flood response in Granite Falls, Minnesota

(Ken Gardner/U.S. Army Corps of Engineers)

Technology Overview

Most of the pumps used for floodwater management are centrifugal-type pumps. While configurations vary, common features of centrifugal pumps are an inlet port, a pump housing where rotating impellers move the water, and a discharge port. Piping and hoses are used to provide access to the water or direct it away from the pump. Pump types that can be used in emergency management of flood situations include portable dewatering, portable trash, mobile trash, power take-off (PTO)-driven, and submersible. The Fiscal Year 2007 U.S. Department of Homeland Security Authorized Equipment List (AEL) reference numbers for portable and mobile pumps include 03SR-02-TPGS, 03SR-02-TPEL, or 12VE-00-SPEC.

Portable Pumps

Portable dewatering and trash pumps can pump up to several hundred gallons per minute (GPM). Dewatering pumps are designed for relatively clean water; higher-cost trash pumps have more rugged construction and parts to handle “dirtier” water (i.e., water that has higher solids content). Many pump systems use screens to prevent over-size debris from entering pump suction lines and clogging or damaging the pump. Portable pumps have gasoline or diesel engines, allowing for operation in areas with no available power supply. With weights less than 250 pounds, they can usually be moved by one or two persons.

Portable pumps can be used for alleviating minor flooding problems, as well as protecting water distribution or wastewater collection lift stations, fire stations, police stations, or hospitals. Pump users should note that pumping out flooded basements too quickly can cause differential pressures on the foundation and may create a collapse hazard, therefore, many agencies no longer provide this service to private property owners.

Mobile Pumps

Mobile trash pumps are larger and heavier than portable pumps and are transported using trailers or skids. The flow rate capacities of mobile trash pumps range from around 500 GPM up to several thousand GPM. These self-powered pumps can also handle very dirty water, and the largest of them can pass debris up to several inches in diameter.



A trailer-mounted trash pump is used for flood recovery in Sweetwater, Florida
(Kevin Galvin/FEMA News Photo)

Mobile, trailer-mounted PTO-driven pumps can also be used for pumping floodwaters. They lack the versatility of self-powered systems because of their need for a separate power source, such as a farm-type tractor. However, they can have much greater flow capacities—over 10,000 GPM for some systems—and can typically handle debris up to several inches in diameter.

Mobile pumps can augment the capabilities of fixed pump and water management infrastructures, and are used to

assist with response and recovery operations in large-scale floods. These pumps may be locally available through public works departments, contractors, or rental companies. Communities that do not have pump resources on-hand can request them through regional mutual aid agreements, or through county, state, and federal emergency management agencies.

Submersible Pumps

Electrically or hydraulically powered submersible pumps are lowered into the water, eliminating the need for suction lines. Submersible pumps are used less frequently in large-scale emergency floodwater management situations because they require external power sources. This limits their usability in areas with no available power supply. An advantage of submersible pumps is their ability to draw water levels nearly down to the surface that the pump is standing on.

Performance Considerations

Factors that can affect pump system performance and flow rate include the amount and size of debris (e.g., silt, sand, mud, organic matter, etc.) in the water, the distance that water is pumped, the type and length of pipe or hose used for suction and discharge lines, and the use of many accessories, such as gates, valves, wyes, or screens.

Agencies should periodically conduct all-hazard risk assessments for their communities, including risk of flooding. Based on the risk assessment findings, agencies should explore mutual aid agreements to share pumps, purchase pumps, or arrange for renting pumps that will meet their requirements. Agencies considering purchasing equipment should examine manufacturer specifications, review the references listed in this document, and consult with responder agencies experienced with using this type of equipment in order to gather information on the operation, periodic maintenance, performance, logistics, and training requirements.

Additional Information

The Association of Equipment Manufacturers Selection Guidebook for Portable Dewatering Pumps and other documents. <http://www.aem.org/CBC/ProdSpec/CPB/index.asp>

Trade journals, such as *Fire Chief*, *Public Works*, or *Rental Equipment Register*, sometimes overview available pump equipment, or provide information on equipment usage, such as:

Conrardy, M. (May 2006). Pump Primer. *Rental Equipment Register*, 49(5), 72, 74.

Whitehead, E. (September 2006). Pump Force: Shift Pump Rentals into High Gear. *Rental Equipment Register*, 49(10), 30-32, 34, 38-39