

Use of Lock and Dam Structures for Spill Containment and Recovery

The Upper Mississippi River Basin Association (UMR) formed a Protection Strategies Work Group to assess the use of lock and dam structures for spill containment and recovery on the upper Mississippi River. This presentation is a summary of the assessment and how the U.S. EPA and U.S. Army Corps of Engineers (USACE), Rock Island District, developed an agreement to allow responders to utilize the lock and dam structures within their district for emergency containment and recovery.

The Protection Strategy Work Group members assessed Lock and Dam # 15 at Rock Island, Illinois, to conceptualize how the Lock and Dam Structures could be utilized for spill containment and recovery. From the assessment, it appears feasible to divert spilled product utilizing deflection boom at the bend in the river immediately upstream of the lock and dam. The spilled material could be contained in the lock structure and collected with vacuum tankers or barges. Other logistical considerations were explored such as shutting down river traffic and shutting down the hydroelectric turbine and river hydraulics.

In addition, the gates at Lock and Dam # 15 can be manipulated to allow the dam to work as an underflow dam to collect product. The gates at Lock and Dam # 15 are roller gates and allow water to flow under the dam. The gates can be manipulated to collect floating material behind the dam. Floating product could then be collected using vacuum units and the hoses can be manipulated with a crane found on the dam. If water flow is disrupted during the emergency phase then USACE, Hydraulics Division, will have to be consulted to assess and monitor river levels up and down stream of the dam.

USACE presented a training to the UMR members to brief them on the construction and contacts at other lock and dam structures on the upper Mississippi including the tributaries; Cal-Sag, Des-Plaines River and the Illinois River. Most of the locks and dams have been constructed in varying designs and a field visit and meeting with on-site personnel, including the Lock Master, is essential in assessing the facility for use as a containment or recovery point during an emergency.

Further work is necessary with USACE, St. Paul District and St. Louis District to assess lock and dam structures on the upper Mississippi. Sub-area plans should review lock and dam structures and emergency contact numbers to evaluate the specific structures that are found in each sub-area due to the difference in construction and physical setting. In large river environments, width, current speed, debris, and traffic render most spill containment and collection techniques ineffective. The lock and dam structures may be the best physical location to pool resources to attempt containment and collection of spilled material. Assessment of these structures and upstream topography, along with written agreements and development of emergency contacts at the lock and dam structure is essential in sub-area planning.

Further work is planned to assess lock and dam structures on the upper Mississippi and research the effectiveness of the use of lock and dam structures for spill containment in floods and other incidents that have already occurred on the Ohio River.

Spills into large river environments creates havoc with most conventional spill containment and recovery operations. The use of lock and dams, diversion techniques, and limiting movement of the spilled material into backwaters are key to a successful response.