



In-Situ Impoundment Closure Method

CCP IMPOUNDMENTS

Silar Services has developed an engineered in-place ash impoundment closure approach that safely addresses risks associated with coal ash disposal, while providing a significantly lower cost option to utilities for compliance with current regulations.

The In-Situ Impoundment Closure Method (ISICM) can eliminate leaching and reduce geotechnical instability that contributes to impoundment failures. This method hydraulically isolates ash from the groundwater by constructing a hydraulic barrier at the bottom of the impoundment using engineered in-situ solidification / stabilization (ISS) applications on the ash and / or underlying natural material. Geotechnical stability is enhanced through increased embankment strength, reduced saturation conditions, and increased slope stability. This innovative in-situ waste remediation approach recently received patent approval (U.S. Patent No. 9,909,277).

ISICM PROVIDES THE FOLLOWING BENEFITS:

Facilitates groundwater corrective action by isolating saturated ash and providing a barrier to prevent continued contamination of groundwater

Significantly reduces the amount of dewatering, treatment, and disposal of ash contact water during impoundment closure

Eliminates the need to site and permit new landfill space for ash from existing impoundments

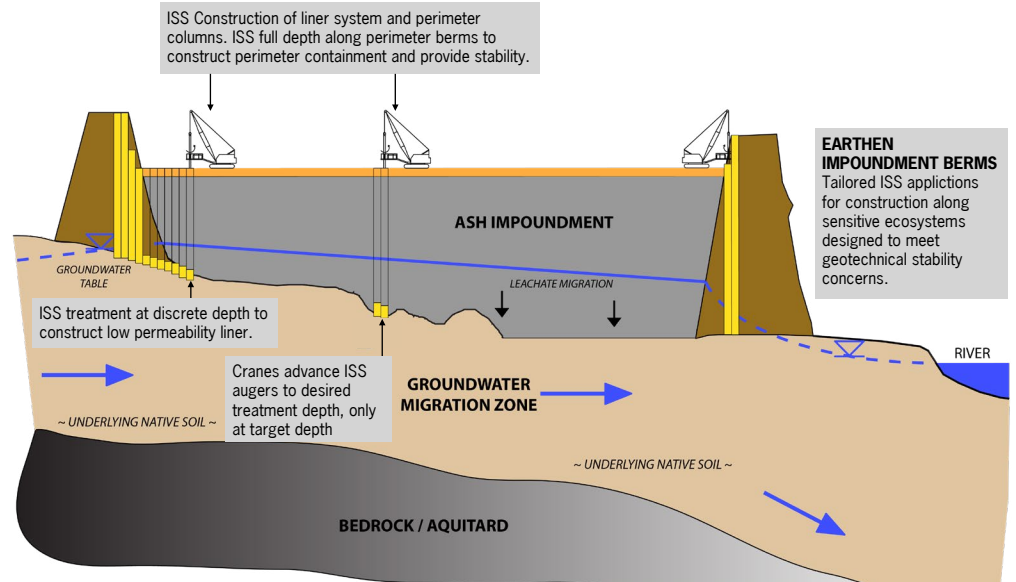
Compliance with requirements for closure and / or corrective action on impoundments that do not meet location or stability criteria

Eliminates the need to remove all ash from impoundments and preserves the majority of the ash for future harvesting

Significantly reduces the cost of impoundment closure



ISS Construction of a Horizontal Liner at the Bottom of the Impoundment and Perimeter Vertical Barrier Wall

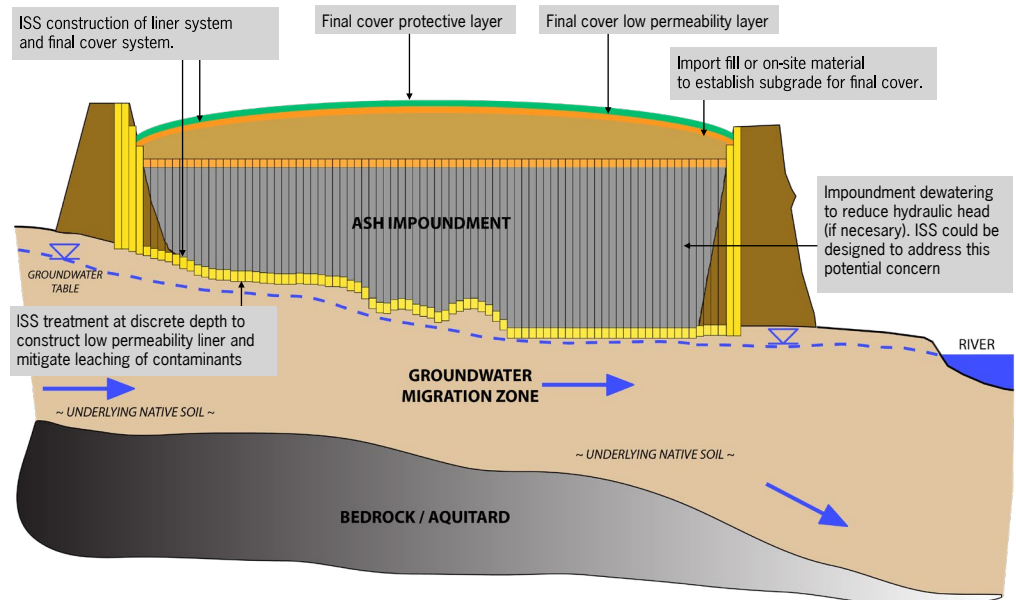


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A horizontal liner is constructed by solidifying ash / native material in a discrete depth interval at the bottom of the impoundment creating a low permeability liner. A vertical barrier is then constructed along the impoundment perimeter by solidifying ash / native material continuously from ground surface to the constructed liner to provide structural stability and prevent potential horizontal migration of groundwater through the impoundment. This prevents both the vertical and horizontal migration of groundwater through the ash impoundment, effectively isolating the ash.

Construction of a Final Cover, Designed to Cap the Impoundment



A final cover system is then designed to cap the impoundment. The cover system is constructed with imported fill and / or on-site materials, and then covered with low permeability materials (e.g., geomembrane, compacted clay) and a soil layer to protect the low permeability layer. The low permeability cover could also be constructed by applying ISS techniques to solidify available surficial ash. The final cover permeability is less than or equal to the liner and results in reduced surface water infiltration to the encapsulated ash.