



# Use of HDPE Vertical Barrier Wall for Remediation of Hazardous Waste Dumpsite

Hermann NG & J.H. SU  
SOLMAX Geosynthetics

**GEOANZ #1**

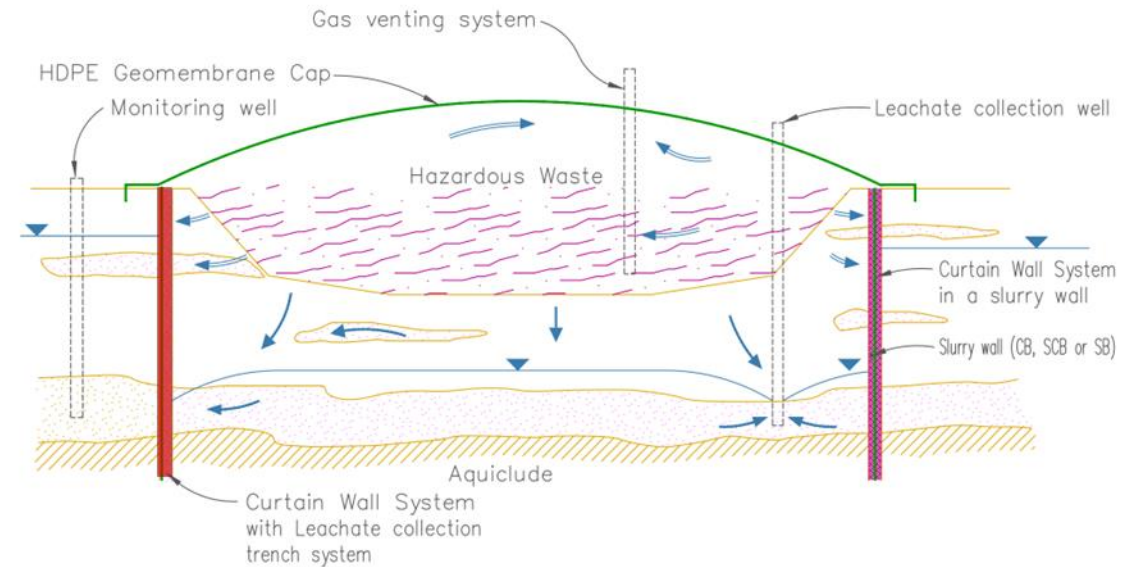
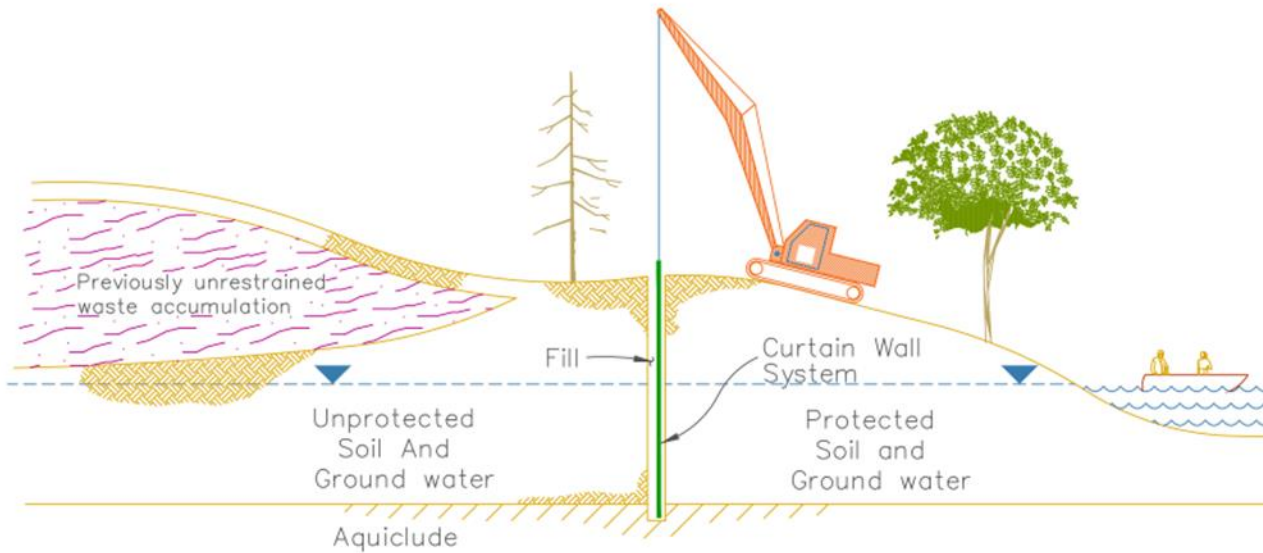
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# Vertical Barrier Wall Systems



VB system has been widely used to arrest further migration of contaminants, protect underground water, contain the contaminated area, allow contractors to return to the site at a later time for remediation.

It can also be welded to a GMB cap to prevent the infiltration of rainwater as shown on the right diagram, reduce leachate loading and to contain any volatile components or gas emissions.

# HDPE Vertical Barrier : CurtainWall



- Reversible HDPE profile
- Interlock profile designed with multiple sealant chambers to accommodate a variety of sealing
- Hydrophilic sealant (HyperTite) is inserted to ensure water tightness of interlock profile. Integrity of joint is important
- Designed for trenched applications, depth is only limited by excavation
- Available in large widths



Top view

# A Remediation of Hazardous Waste Dumpsite



Site location: Huizhe County, North Zhehai Basin, Qujing, Yunnan Province, China .

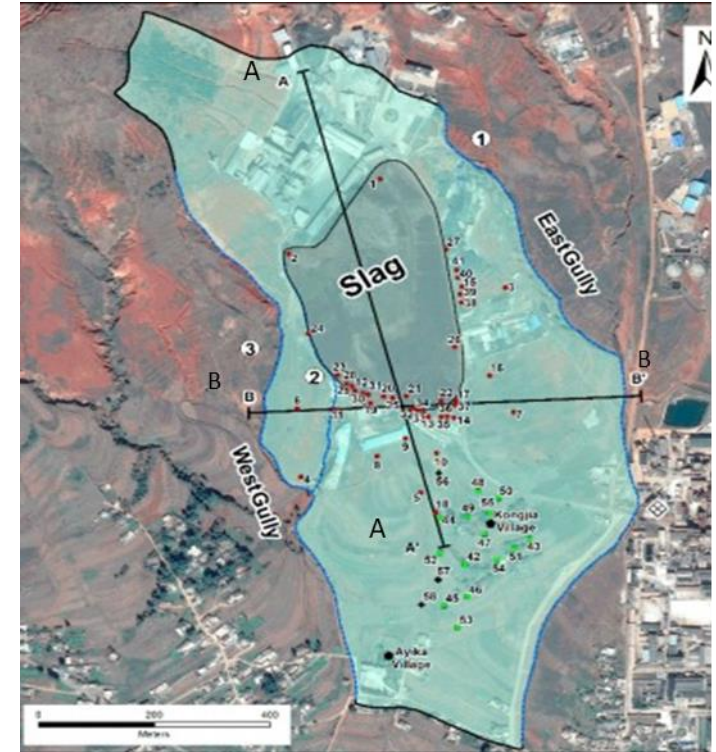
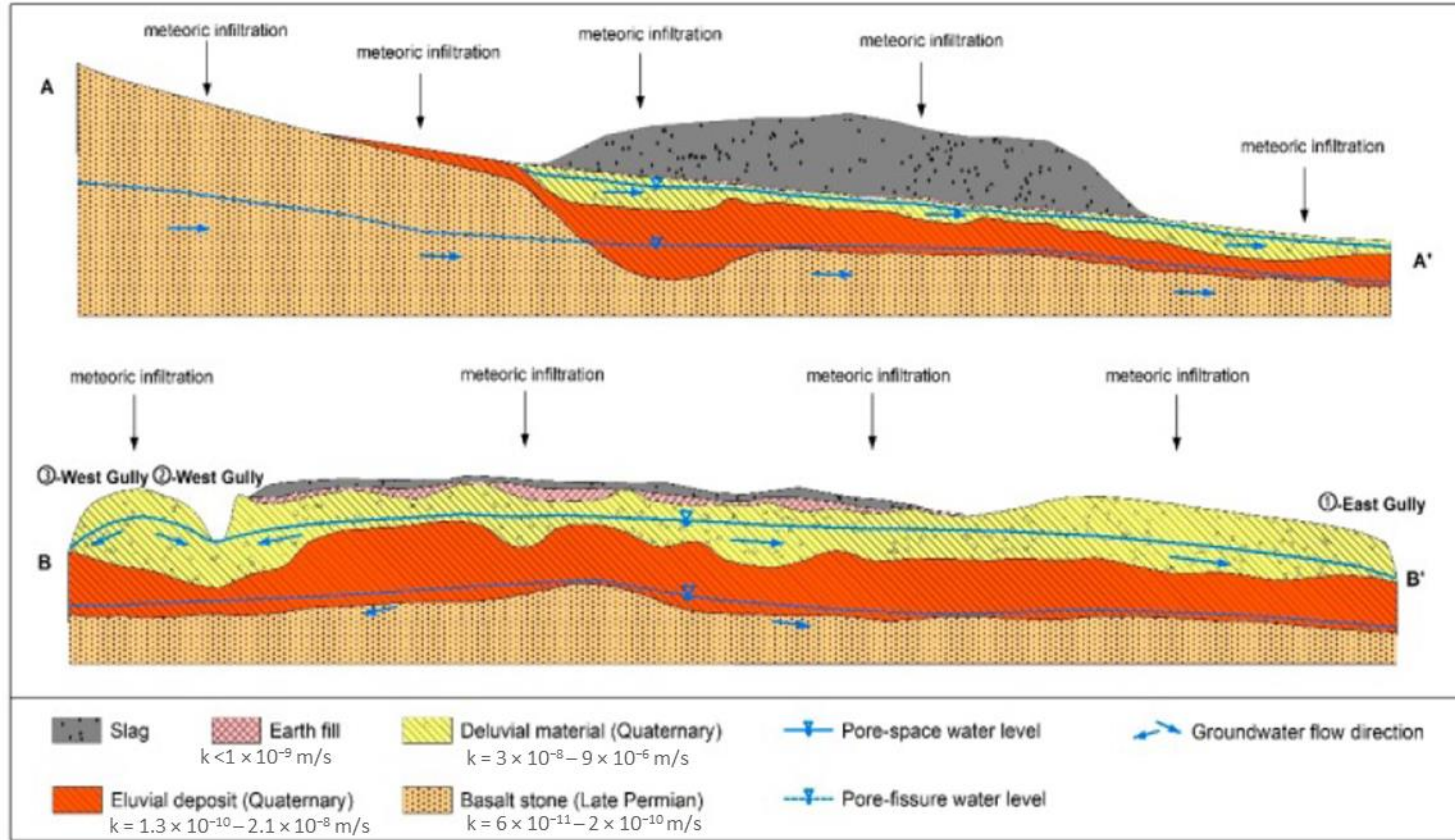
- Remediation for a contaminated waste dumpsite using vertical barrier.
- It is a smelting plant producing zinc, lead, germanium, and other non-ferrous metals .
- The plant has been operating since 1965, the byproduct from the smelter has been accumulated year by year from the water-quenched slag and mixed with domestic waste and construction waste from the towns nearby; this has eventually caused an impact to the surrounding environment.
- In 2014 an investigation was carried out to study its impact and design a site remediation, to restore the contaminated site, stop the leachate from further migrating to the downstream.

# The Waste Dump

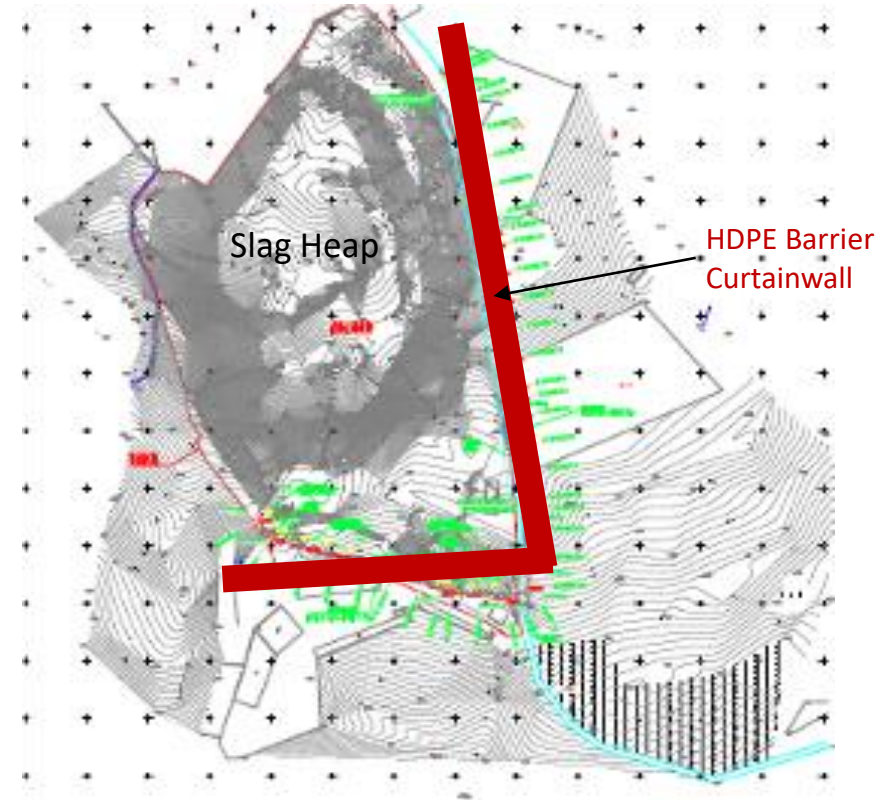
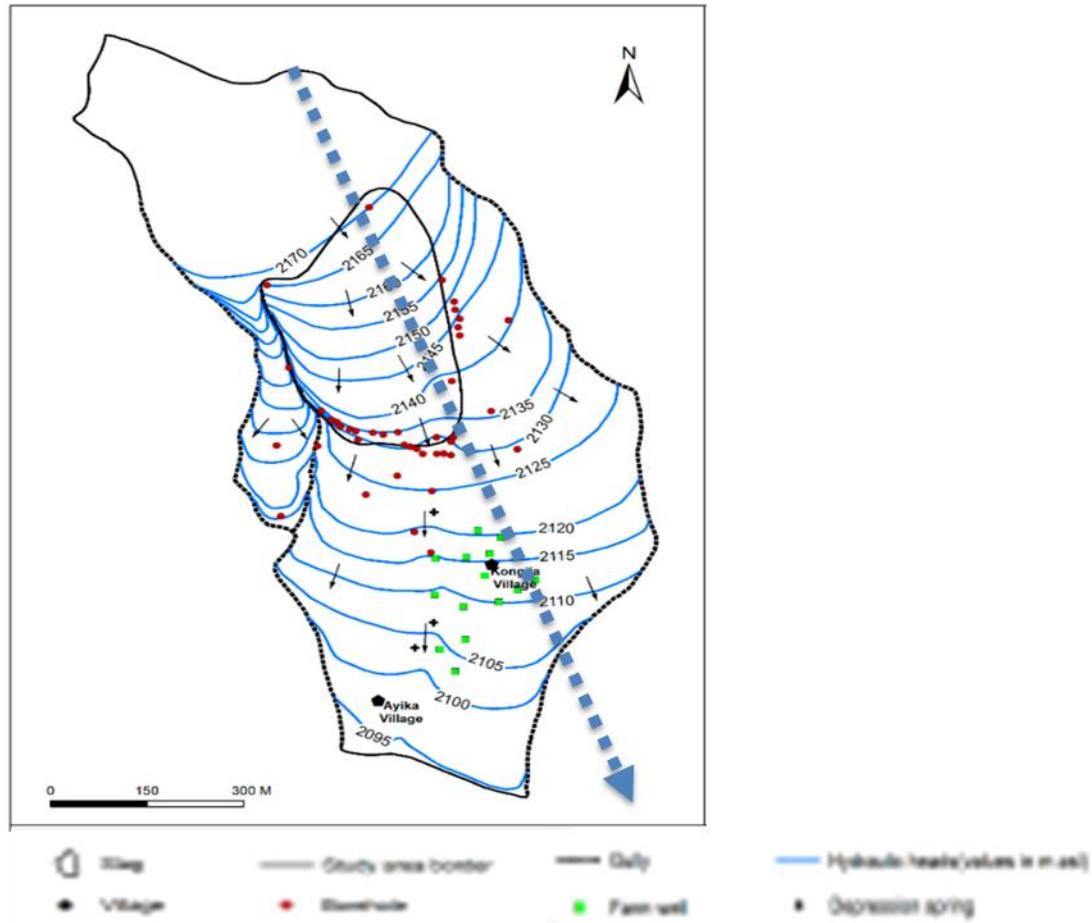


- Location: Yunnan, Southwest of China.
- More than 50 years of smelting slag waste dump site without base liner
- Waste coverage area 110,000 m<sup>2</sup>, dump height more than 70 m, total slag volume about 3 million cubic meters.
- The wastedump contains high toxicity. Without a proper base liner system, the leachate from the wastepile has gradually contaminated the soil & groundwater at downstream, which has affected the daily life of the nearby local residents.

# Subsoil Stratigraphic Condition



# Pore water level contour map

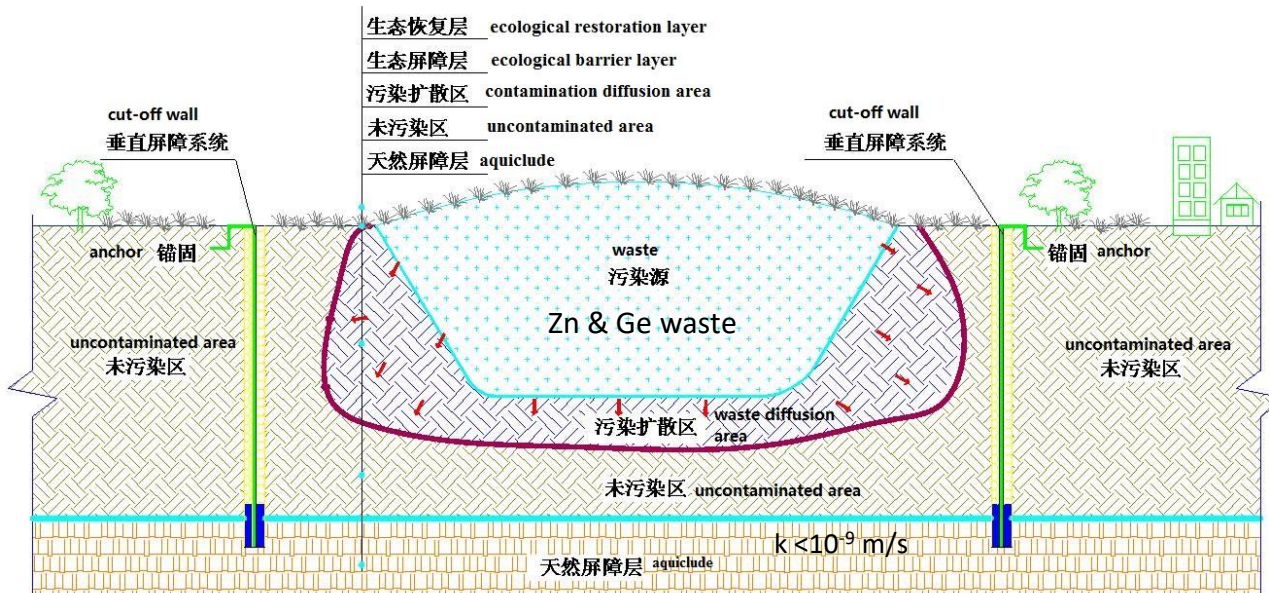


Site remediation using the in-situ treatment approach



# Vertical Barrier Wall

HDPE Cut-off wall was designed and constructed in the upstream and downstream of the waste pile, penetrated to the low permeable clay layer, to stop the migration of contaminants. Width of excavated trench **0.6m**.



- Total length of HDPE barrier = 702m
- Total barrier area = 15,000m<sup>2</sup>
- Depth of barrier = 10 – 30m

# Trench Excavation



2m deep concrete guide wall

- Depth of excavated trench: 10-30m;
- Width of the excavated trench: 0.6m;
- Thickness of sealant at the trench base : 0.5m
- Bentonite slurry used to stabilize the trench during excavation
- Excavation started from the southeast corner

# HDPE Panel Installation



- 3mm CurtainWall panels at 4m width ~19,000m<sup>2</sup>
- $\phi$ 8mm HyperTite ~ 3,600m ;
- 6840 nos. of CurtainWall interlocks
  
- The site was quite windy and because of the sensitive surrounding communities, tall steel frame was not permitted by the safety officer.
  
- An installation drum facilitated with hydraulic jacks was used for the installation..

# Installation with Sealant Insertion



- The lead panel is positioned in the trench, before the installation of subsequent panel, HyperTite rubber sealant in rod form was fixed at the toe of the panels to be installed and then inserted into the chamber of the interlock.
- the rubber sealant was fed in the right chamber and the two panels were securely locked with each other.

# Final Placement of the Vertical Barrier



- At the time one panel has been put in place in the trench, the panel will be attached to a steel frame standing in the trench to offer structural support, until the next connecting panel is completed then only the steel frame supporting the first panel can be removed.
- Once the HDPE panels are completely installed, the HDPE panel base was grouted & sealed, leak detection was performed with sensors connected with a cable at 0.65m spacing lowered down vertically in the trench

# Summary

- The first HDPE vertical wall built to contain the contaminated site for remediation of the contaminated soil and groundwater in mainland China
- Through a state-of-the-art installation technique, the contractor took almost 6 months to complete the construction of the barrier system with capping on the waste dumpsite in the remediation project
- 3.0mm thick HDPE panel with unique interlocking system and hypertite with high swelling capacity was used, wall penetration depth ranges from 10m~30 meters below ground.
- With the successful implementation of HDPE CurtainWall, it has been well-received as a feasible and appropriate vertical barrier systems for immediate protection, containment and future remediation of contaminated sites in China.



**THANK YOU**