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Jet-Grouting Constructed Laminar Diaphragms

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JET-GROUTING CONSTRUCTED LAMINAR DIAPHRAGMS

THE NEED

The high cost of digging and hauling contaminated soil has made enclosure of the contaminated soil an alternative to prevent contamination of ground water and adjacent sites.

THE TECHNOLOGY

Jet-grouted laminar diaphragms are impermeable barriers constructed underground using special jet-grouting techniques. By jetting grout into the soil through properly spaced drill holes, a continuous diaphragm, or membrane, may be constructed to prevent the passage of water or other fluids that may contain toxic or hazardous chemicals.

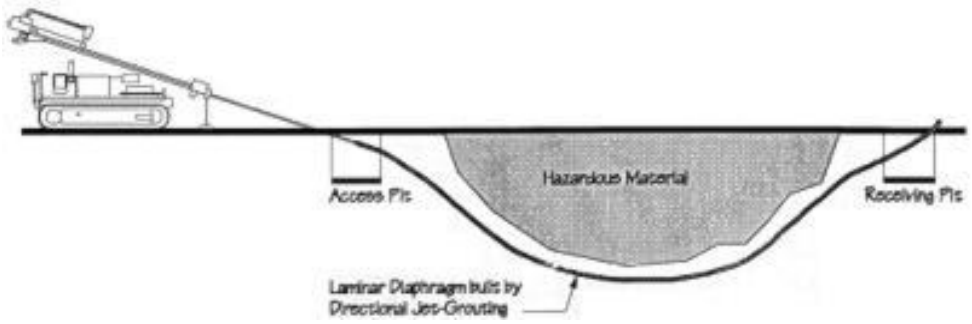

FIGURE 1 SCHEMATIC DIAGRAM

Drill holes are spaced according to the plans of the project. If the grout diaphragm is to be vertical, commonly used drilling equipment is used. If the drill holes are to follow a particular shape, such as would be the case if the membrane were to be placed beneath a hazardous waste site, then directional drilling equipment is needed.

The jet-grouting method uses special grout nozzles to create a grout sheet of controlled width and thickness from each drilled grout hole. This sheet is commonly 100 mm. to 150 mm. in thickness, 2 to 3 meters in width, and of any desired length. The width of the sheet in one pass can go up to 6 meters. Actual lateral soil penetration of the grout jets is a function of the nature of the soil, the type of equipment used, the skill of the operator, and other factors.

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The Benefits

Cost reduction of soil remediation by eliminating the need for excavating and hauling. The system effectively and economically replaces impermeable diaphragm construction systems like conventional grouting, bentonite slurry walls, sheer piling and others. Light construction machinery, makes the system versatile to different and tight geometry and of fast implementation anywhere it is needed.

Status

This technology was nominated for the 1994 NOVA Award. It has been recently commercialized, and its implementation at the industry level has started. Experimental laminar diaphragm construction is presently underway under the sponsorship of the Dupont Corporation and the Federal Department of Energy. Other experimental and successful construction was completed in Germany to contain leaching of hazardous and aggressive chemical refuses in waste lagoons.

Barriers

Implementation and continuity of the diaphragms could be complicated by factors like, the existence of large obstructions or obstacles, the need for frequently varying construction alignments and underpassing environmentally contaminated areas, the need for protective measures and for special control of jetted effluents when working in hazardous conditions, the need to use grout mixes that are not destroyed by chemicals in the ground.

Point of Contact

Mr. F.A. Bares, F.A.B.E. Associates. Construction Consultants. 69 Fletcher Street; Winchester, MA 01890. Phone: (781) 729-3656.

References

1. Nominations for 1994 NOVA Award.
2. F.A.B.E. Associates technology description material.

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REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

Purdue University does not endorse this technology or represents that the information presented can be relied upon without further investigation.

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