Interim Final Report

EFFECTS OF LEACHATE ON THE HYDRAULIC CONDUCTIVITY OF BENTONITE AND CONTAMINANT-RESISTANT BENTONITE IN GUNDSEAL®

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Purpose and Scope of Work

The purpose of this investigation is to determine the effects of aggressive permeant liquids from landfills and impoundments upon the hydraulic conductivity of the bentonite component of Gundseal®. The most important factors that affect the hydraulic conductivity of bentonite include whether or not the bentonite is hydrated with water prior to permeation, the type and strength of permeant liquid, and the type of bentonite.

Eighteen hydraulic conductivity tests were performed in which the bentonite component of Gundseal® was permeated with different liquids. The five permeant liquids were:

1. A highly acidic liquid, 0.1 M hydrochloric Acid (HCl),
2. A highly caustic liquid, 0.1 M sodium hydroxide (NaOH),
3. An aggressive, simulated municipal solid waste (MSW) leachate
4. An actual municipal solid waste leachate (MSW), and
5. An aggressive, simulated hazardous waste (HW) leachate.

The tests involving actual MSW leachate are still in progress, although the tests have progressed to the point where the conclusion from the tests is clear. Final results will be presented in an updated version of this report when the tests are completed.

Results and Discussion

Results from the hydraulic conductivity tests are summarized in Table 1. Plots of hydraulic conductivity versus pore volumes of outflow for each one of the tests are presented in the Appendix B.

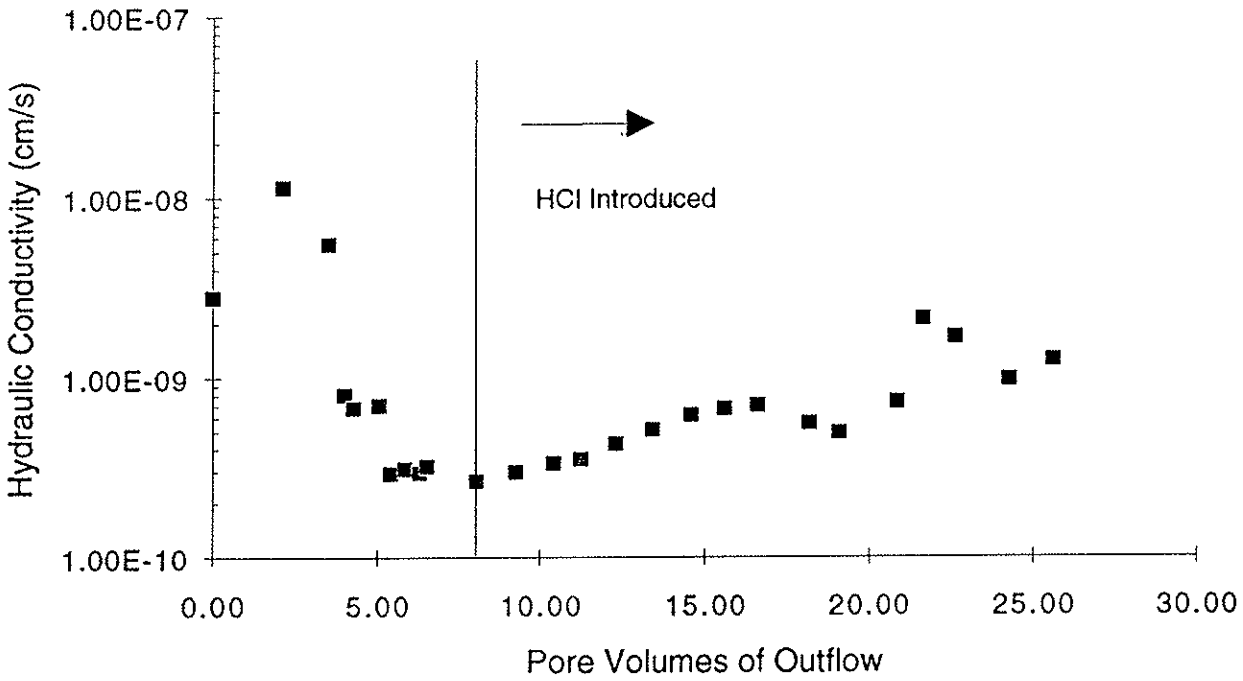
Table 1. Summary of Hydraulic Conductivity Test Results for Gundseal® and Contaminant-Resistant Gundseal® (Note: PV Indicates Pore Volume).

	Contaminant-Resistant Gundseal®		Regular Gundseal®	
	Prehydrated with Water	Non-prehydrated	Prehydrated With Water	Non-prehydrated
Actual MSW Leachate --				
Hydraulic Conductivity (cm/s)	-	4×10^{-10}*	-	5×10^{-10}*
PV of Leachate Outflow	-	2.5*	-	3.1*
Simulated MSW Leachate --				
Hydraulic Conductivity (cm/s)	3×10^{-10}	8×10^{-6}	2×10^{-9}	2×10^{-5}
PV of Leachate Outflow	12.8	17.3	5.6	10.4
Simulated Haz. Waste Leachate --				
Hydraulic Conductivity (cm/s)	8×10^{-10}	3×10^{-10}	2×10^{-9}	1×10^{-9}
PV of Leachate Outflow	3.5	10.1	7.7	2.3
0.1 M HCl (Strong Acid) --				
Hydraulic Conductivity (cm/s)	2×10^{-9}	5×10^{-6}	3×10^{-10}	2×10^{-7}
PV of Leachate Outflow	17.6	16.5	2.5	4.0
0.1 M NaOH (Strong Base) --				
Hydraulic Conductivity (cm/s)	5×10^{-10}	2×10^{-6}	1×10^{-6}	1×10^{-6}
PV of Leachate Outflow	8.3	24.3	15.7	8.7

* Indicates that test is still in progress.

The three variables of primary concern in this hydraulic conductivity study were the type of bentonite, the condition of hydration prior to permeation with an aggressive permeant liquid,

Hydraulic Conductivity Results for Contaminant Resistant Gundseal® Saturated with Tap Water, then Permeated with 0.1 M HCl



Hydraulic Conductivity Results for Regular Gundseal® Saturated with Tap Water, then Permeated with 0.1 M HCl