# Calculation

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Job No: **22007-011-120/6050** Calculation No: **BUF-96-106** Date: **September 23, 1996**

**Subject:** Geonet Transmissivity

**Purpose:** Verify that Geonet proposed by GSE will conform to design requirements.

**Index:**



**References:**

1. Richardson, G.N. and Koerner, R.M., "Geosynthetic Design Guidance for Hazardous Waste Landfill Cells and Surface Impoundments, U.S. Environmental Protection Agency, Hazardous Waste Research Engineering Laboratory, Office of Research and Development, Cincinnati, Ohio, Dec. 1987, EPA/600/2-87/097.

**Approach:**

Compute required transmissivity for geonet, considering the fact that only 6 inches of the sand layer placed above the geonet is required as a separation medium so that the lower 6 inches can function as part of the upper leachate collection system. Use calculation method in Example 3.1 of reference 1.

**Prepared by:** _____ 9/23/96
Signature Date

**Checked by:** _____ 9/23/96
Checker Date

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Sheet No. 2 of 4
Calc. No. BUF-96-1062
Rev. No. 0.00
By RZB Date 9/20/96
Chk'd. [illegible] Date 11/[illegible]/96

Job No. 22007-011-120/6050 Job MIXED WASTE POND CLOSURE
Client BP CHEMICALS Subject PROPERTIES OF GEONET

1. REQ'D TRANSMISSIVITY FOR 1' (30cm) OF $10^{-2}$ CM/SEC SAND = $3 \times 10^{-5}$ $m^2$/SEC. PER RCRA MIN TECH REQMTS.

2. DESIGN CALLS FOR 12" OF SAND OVER LCS. RCRA MTR CALLS FOR 6" FILTER. THEREFORE LOWER 6" OF SAND CAN FUNCTION AS PART OF LCS.

3. ASSUMING THE HYDRAULIC CONDUCTIVITY OF THE SAND IS NO GREATER THAN THE MINIMUM SPECIFIED ($10^{-2}$ CM/SEC.)

TOTAL TRANSMISSIVITY REQ'D − TRANSMISSIVITY OF 6" OF SAND

$= 3 \times 10^{-5}\ m^2/SEC - (15\ cm)(10^{-2}\ cm/sec)(10^{-4}\ m^2/cm^2)$

$= 1.5 \times 10^{-5}\ m^2/SEC.$

4. CONFINING STRESS. MAX HEIGHT OF COIL, SLUDGE, CAP, ETC. IS 60 FT. ASSUMME AVG UNIT WT OF 120 LB/FT$^3$

$\sigma_m = (60)(120) = 7,200$ LBS/FT$^2$ USE 10,000 PSF. LOAD.

5. HYPERNET @ 10,000 PSF HAS T = $4 \times 10^{-4}$ $m^2$/SEC. PER TEST RESULT FROM GSE LINER SYSTEMS (SH. 3).

DES. RATIO = $\frac{4 \times 10^{-4}}{1.5 \times 10^{-5}}$ = 26.7 > 10 OK

6. MINIMUM AVERAGE ROLL VALUE (MARV) GUARANTEED BY GSE IS $1 \times 10^{-4}$ $m^2$/SEC. (SH 4)

DES. RATIO = $\frac{1 \times 10^{-4}}{1.5 \times 10^{-5}}$ = 6.7 MARGINALLY OK.

# GSE Lining Technology, Inc.

## Hydraulic Transmissivity Test Results
## ASTM D 4716

*Job Information*

Job Name : _____

MR No. : _____

Job No. : _____

CALCULATION SHEET

JOB No: 22007-011-120/6050

CALC. No: BUF-96-106

REV: 0.00 DATE: 9/20/96

ORIG: R BLICKWEDEHL

CK: TE DATE: 9/23/96

SHEET: 3 OF 4

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*Sample Information*

Roll No. : 10044997

Resin Lot No. : 7141165

Product I.D. : XL4000N001

*Test Information*

Boundary Conditions:

SS PLATE
60 MIL HDPE
HYPERNET
6 OZ. GEOTEXTILE
SITE SAND
SS PLATE

@ 9979

Test Conditions : 10,000 PSF normal load(s)
0.25 gradient(s)

Results : Transmissivity (m²/sec)

| Pressure (psf) | Gradient 0.25 |
|---|---|
| 10000 | 3.98E-04 |

Technician: JIMMY YOUNGBLOOD

Date: 9/4/96

Report Date
9/4/96
JGY

Page 13300-2, Article 2.1.1.5 & Article 7.2.1.2.5.
The geonet properties specified exceed GSE standards. The following values shall apply for material furnished for this project:

| Property | Test Method | Specified Value | GSE Value |
|---|---|---|---|
| Transmissivity gradient of 0.25 and pressure of 10,000 psf | ASTM D4716 bounded by HDPE above and below | 10 gal/min/ft | $1.3 \times 10^{-3}$ m²/s |
| Transmissivity gradient of 0.25 and pressure of 10,000 psf | ASTM D4716 bounded by HDPE below and geotextile and soil above | 5 gal/min/ft | ~~$1.0 \times 10^{-3}$ m²/s~~ |

The specified test frequency of 1 per 10,000 sf for transmissivity exceeds GSE standards. GSE will perform this test once per project and provide certification for each roll shipped to the site.

CALCULATION SHEET

JOB No: 17007-011-120/6050

CALC. No: BUF-96-106

REV: 0.00 DATE: 9/20/96

ORIG: R. BLICKWEDEHL

CK: _____ DATE: _____

SHEET: 4 OF 4

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