3.5" LANPAC® proven superior for removing PCE from groundwater in packed tower air strippers

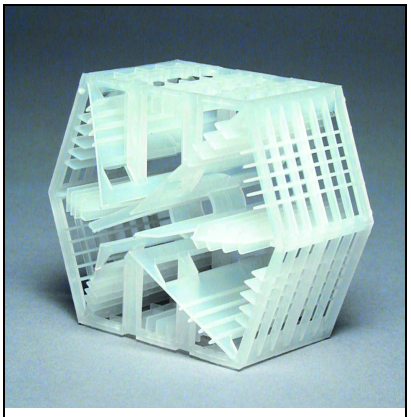
the problem

Dry cleaning fluids have contaminated groundwater supplies in all areas of the United States. One of the most common contaminants is PCE (perchloroethylene or tetrachloroethylene, Cl2C=CCl2). As a suspected carcinogen, PCE must be removed from water to very low levels. The US EPA maximum contaminant level (MCL) for PCE in drinking water is 5 ppb (5 parts per billion, or 5 mg/L). States such as New Jersey have set MCLs as low as 1 ppb for PCE in public water supplies.

Air stripping is widely used as an effective, economical method of removing PCE from groundwater. Water is pumped to a packed tower with air flowing upward through random packing to vaporize dissolved PCE. If the air stripper is properly sized and operated, the treated water will have PCE content below the MCL, and hence will be suitable for public use.

the solution

Numerous tower packings are available for use in air strippers. Independent testing has shown that the most efficient high-capacity packing for removing PCE from water is 3.5" LANPAC® supplied by Lantec Products.



3.5" LANPAC®

The efficiency of tower packings is expressed as the height of transfer unit (HTU), which is the depth of packing needed to accomplish a given degree of purification. The smaller the HTU of a given packing, the more efficient that packing is, so the smaller an air stripper will need to be to do the job.

Larger sized packings are generally less expensive, since there are fewer pieces per cubic foot, and they require less fan power to move air through a packed tower.

breakthrough results

In order to compare the efficiency of different tower packings for purifying PCE-contaminated groundwater, the San Bernardino Water District tested a series of random packings in the same air stripper under identical conditions. As can be seen, 3.5" LANPAC showed better (lower) HTU than any other packing tested (including some smaller sized packings).

Conclusion

This design example based on the measured HTUs shows that using 3.5" LANPAC® allows an air stripper to be built at lower cost. The tower will be as small as possible and the cost of the packing required to fill the air stripper will be minimized, so capital dollars will be used as efficiently as possible.

Lantec Products offers free design assistance. Please feel free to contact sales@lantecp.com for help in sizing your air stripping projects and minimizing their costs.

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3.5" LANPAC® allows an air stripper to be built at lower cost.

HTU (ft) of Various Packings Stripping PCE

Test Conditions: Tower Diameter 3 ft, Packing Depth 7-17 ft, 68 °F water, PCE Inlet 40 - 130 ppb

Test No.	Air to Water Ratio (cfm/cfm)	Liquid Loading (gpm/ft^2)	3.5" Pall Rings	#3A Mini Rings	3.5" Jaeger Tri-Packs®	Norton Snowflake®	2" Jaeger Tri-Packs®	3.5" Lanpac
1	93.5:1	14	4.07	3.26	3.63	3.45	2.63	2.41
2	62:1	21	4.58	3.58	4.06	3.77	2.84	2.40
3	50:1	26.5	4.78	3.83	4.25	3.78	2.71	2.93
4	82:1	14	3.95	3.08	3.10	3.28	2.54	2.44
5	55:1	21	3.82	3.56	3.74	3.93	2.99	2.63
6	44:1	26.5	4.96	3.49	4.15	4.23	3.19	2.87
7	75:1	14	4.02	2.72	3.36	3.68	2.66	1.84
8	50:1	21	4.40	3.52	4.07	4.08	2.75	2.46

Design Example Comparison

These data can be scaled up for a typical design, as follows:

Conditions

Groundwater Flow:	*588 gpm*
Water Temperature:	*68°F*
Liquid Loading:	*21 gpm/ft^2*
Tower Diameter:	*6 ft*
Air/Water Ratio:	*50 ft^3/ft^3*
Air Flow:	*3,930 cfm*
Contaminant:	*PCE*
Inlet:	*5 ppb*
Required Outlet:	*0.5 ppb*

Packing Depth Required (with 25% safety factor)

3.5" Tri-Packs	2" Tri-Packs	**3.5" LANPAC®**
12 ft	8 ft	**7.5 ft**

References

[1] Silver Spring, MD: Air Stripping Removing Contaminants from Groundwater, www.brownfieldstech.org/cities/silver_spring.html
[2] The Mountain Lakes, NJ, Air Stripper, www.mtnlakes.org/Borough/EC/airstrip.htm
[3] Kansas Dry Cleaning Groundwater Remediation, Hays, Salina and McPherson, Bob Jurgens, Kansas Department of Health and Environment, www.brownfieldstech.org/summit/jurgens1.pdf
[4] Results of testing performed by the San Bernardino, CA Water District, September, 1998