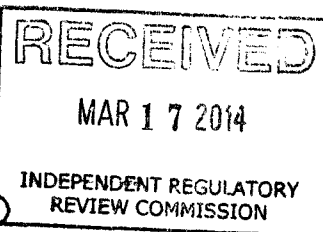


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**Geosynthetic Institute**  
 475 Kedron Avenue  
 Folsom, PA 19033-1208 USA  
 TEL (610) 522-8440  
 FAX (610) 522-8441



March 10, 2014

Environmental Quality Board  
 P. O. Box 8477  
 Harrisburg, PA 17105-8477

RE: Proposed Amendments to 25 Pa-Code, Chapter 78, Subchapter C

Dear All,

We represent 72 firms and agencies dealing with the proper development and use of geosynthetic materials including "synthetic flexible liners" which are called "geomembranes" by many other organizations. Among our 18 agency members is the Pennsylvania Department of Environmental Protection with Steve Socash as our contact person... see our website at [www.geosynthetic-institute.org](http://www.geosynthetic-institute.org) for details. This communication has two major points which we ask you to seriously consider as you go forward with your regulations.

1. The original Subchapter C – Environmental Protection Performance Standards has a  $1 \times 10^{-7}$  cm/sec maximum permeability for the synthetic flexible liner being used. This is a ridiculously high value and represents a typical clay or silt soil. Geomembranes have permeabilities down to  $1 \times 10^{-13}$  cm/sec and should be referenced and regulated as such. The agency is confusing everyone (including the public) by having such a high value representing the liner material for all types of containment pits.
2. *The proposed January 15, 2014 regulation banning the use of lined pits is completely inappropriate.* A properly lined geomembrane pit manufactured with polymers such as high density polyethylene (HDPE) will outlast steel storage tanks by decades.\* Attesting to this established fact is that all landfills and surface impoundments for nonhazardous and hazardous solid and liquid wastes are lined accordingly. Their performance has been documented over time and with the use of double lined systems allows for the development of an "action leakage rate" for ultimate security of adjacent land and waters.\*\* Your proposed banning of geomembrane lined pits for flowback and

\*"Lifetime Prediction of Laboratory UV Exposed Geomembranes," by R. M. Koerner, G.R. Koerner, Y. G. Hsuan and W. K. Wong, GRI Report #42, January 3, 2013, 37 pgs.

\*\*"Assessment and Recommendations for Improving the Performance of Waste Containment Systems," by R. Bonaparte, D. E. Daniel and R. M. Koerner, EPA/600/R-02/099, December 2002, 950 pgs.

production drilling waters flies in the face of the entire solid and liquid waste technology as practiced by the U.S. EPA and every state agency (including Pennsylvania) as well.

As a Pennsylvania resident my entire life and working with the PaDEP since its original founding, I ask you to re-consider your stance insofar as pit lining for flowback and production waters at drilling sites and operations. As you likely know the potential for contamination of these drilling fluids pales into insignificance in comparison to hazardous, and even nonhazardous, leachate from the solid and liquid waste industries.

Very truly yours,

A handwritten signature in black ink, appearing to read "Robert M. Koerner", with a large, sweeping flourish at the end.

Robert M. Koerner, Ph.D., P.E., NAE  
Director Emeritus  
Geosynthetic Institute

Attachment: resumé

## RESUME

**Robert M. Koerner, Ph.D., P.E., NAE**  
**<[robert.koerner@coe.drexel.edu](mailto:robert.koerner@coe.drexel.edu)>**

### I. Personal

Date of Birth: December 2, 1933  
Married: Wife – Pauline W. Feuerer  
Children – Michael R. Koerner (October 2, 1960)  
George R. Koerner (February 15, 1962)  
Pauline K. Limberg (August 17, 1964)  
Grandchildren – David, Paula, Addie, Robert, Max, Helena  
Residence: 130 Wood Road, Springfield, Pennsylvania 19064

### II. Education

B.S.C.E. – Drexel Institute of Technology – Philadelphia, PA - 1956  
M.S.C.E. – Drexel Institute of Technology – Philadelphia, PA - 1963  
Ph.D. – Duke University – Durham, NC - 1968

#### Additional Studies

Soil Mechanics @ Columbia University – New York, NY – 1956-59  
Law @ Temple University – 1964  
Mathematics @ University of Delaware – Newark, Delaware – 1964-65

### III. Teaching Experience

1964 – 1965 Instructor, School of Engineering  
Pennsylvania Military College, Chester, PA  
1965-1967 N.S.F. Teaching Intern in Civil Engineering  
Duke University, Durham, North Carolina  
1968 – present Drexel University:  
Assistant Professor - 1968  
Associate Professor - 1971  
Professor - 1975  
H. L. Bowman Professor - 1984  
Emeritus Professor - 2003

### IV. Institute Experience

1986-present Founder/Director – Geosynthetic Research Institute  
1995-present Founder/Director – The Geosynthetic Institute

### V. Industrial Experience

1956 – 1960 - Engineer and Superintendent (highway and heavy construction in PA, NJ and NY.) The Conduit and Foundation Corp., Philadelphia, PA  
1960 – 1962 - Engineer – Analyst (involved in all aspects of soil consulting practice), Dames and Moore, Consulting Soil Engineers, New York, NY  
1962 – 1963 - Engineer and Superintendent (industrial foundation design and consultation, and general heavy construction), J. J. Skelly, Inc., Media, PA  
1968 – 1986 - Private consultant in Geotechnical and Foundation Engineering, Powder Metallurgy, Powder Processing and Behavior, Nondestructive Testing, Geosynthetics, Professional Witness Investigations and Legal Testifying: (Incorporated as Geotechnical Research Inc., 1976)  
1986 – present - Advisory consultant in geosynthetics to member organizations of the Geosynthetic Research Institute/Geosynthetic Institute

## VI. Professional Memberships

American Society of Civil Engineers (ASCE)  
American Society for Testing and Materials (ASTM)  
International Geotextile Society (IGS)  
North American Society of Geosynthetics (NAGS)  
Registered Professional Engineer (PE) Pennsylvania #19855-E

## VII. Publications (author or co-author)

|                                     |              |
|-------------------------------------|--------------|
| Books, Book Chapters, Major Reports | - 79         |
| Refereed Journal Articles           | - 156        |
| Conference Proceedings Papers       | - 226        |
| Misc. Papers and Articles           | - <u>118</u> |
|                                     | 579          |

## VIII. Funding Experience (some with others)

|                           |                  |
|---------------------------|------------------|
| Geotechnical Engineering  | \$1,140,000      |
| Nondestructive Evaluation | 1,600,000        |
| Geosynthetics             |                  |
| - environmental related   | 3,090,000        |
| - transportation related  | 840,000          |
| - industrial consortium   | <u>8,000,000</u> |
|                           | \$14,670,000     |

## IX. Major Professional Offices and Honors

|              |                                                                                                                     |
|--------------|---------------------------------------------------------------------------------------------------------------------|
| Chairman     | - American Society for Engineering Education (ASEE) – 1974-1975                                                     |
| President    | - Philadelphia Section, American Society of Civil Engineers (ASCE) – 1975-1976                                      |
| Recipient    | - Outstanding Educators of America – 1972                                                                           |
| Recipient    | - Lindback Award for Distinguished Undergraduate Teaching at Drexel University – 1974                               |
| Co-Recipient | - Industrial Research IR-100 Award, Earth Dam Spill Alert Device – 1977                                             |
| Recipient    | - Inter Fraternity Association Undergraduate Teaching Award – 1977-1978                                             |
| Recipient    | - Delaware County Chapter, Pennsylvania Society of Professional Engineers, Engineer-of-the-Year – 1978              |
| Co-Recipient | - 1 <sup>st</sup> Neal Rice Award – Intl. Briquetting and Agglomeration Society - 1979                              |
| Recipient    | - Western Electric Fund Award American Society of Engineering Education, 1980                                       |
| Recipient    | - Delaware Valley, Engineer-of-the-Year, 1981                                                                       |
| Recipient    | - Honorary Doctorate of Engineering Science, Spring Garden College, Philadelphia, PA and Commencement Speaker, 1981 |
| Recipient    | - Civil Engineer-of-the-Year, Philadelphia, PA – 1989                                                               |
| President    | - North American Geosynthetics Society (NAGS) – 1989-1991                                                           |
| Recipient    | - Honorary Member in the American Society of Civil Engineers (ASCE) – 1992                                          |
| Recipient    | - 1 <sup>st</sup> Mercer Lecture (IGS/ISSMFEE) – 1992                                                               |
| Recipient    | - Award of Merit and Fellow (ASTM) – 1994                                                                           |
| Recipient    | - Award of Merit in Design (IGS) – 1994                                                                             |
| Co-Recipient | - Award of Excellence (NAGS) – 1995                                                                                 |
| Recipient    | - 32 <sup>nd</sup> Terzaghi Lecture (ASCE) – 1996                                                                   |
| Co-Recipient | - 1 <sup>st</sup> T. Allen Haliburton Award (ASTM) – 1996                                                           |
| Recipient    | - 1 <sup>st</sup> Giroud Lecture (IGS) – 1998                                                                       |
| Member       | - National Academy of Engineering – 1998                                                                            |
| Co-Recipient | - 3 <sup>rd</sup> T. Allen Haliburton Award (ASTM) – 1998                                                           |
| Recipient    | - 1 <sup>st</sup> Burmister Lecture (Columbia Univ.) – 1999                                                         |
| Recipient    | - 2 <sup>nd</sup> Terzaghi Lecture (TU Vienna) - 1999                                                               |
| Recipient    | - 8 <sup>th</sup> Kersten Lecture (Univ. Minnesota) – 2000                                                          |
| Co-Recipient | - James R. Croes Medal (ASCE) – 2000                                                                                |

|              |                                                                                                 |
|--------------|-------------------------------------------------------------------------------------------------|
| Recipient    | - 4 <sup>th</sup> George Sowers Lecture (Geo. Tech) – 2001                                      |
| Recipient    | - 2 <sup>nd</sup> CAEE Department Alumni Lecture (Drexel Univ.) – 2001                          |
| Recipient    | - 10 <sup>th</sup> Jack Hilf Lecture (Univ. Colorado) – 2002                                    |
| Recipient    | - 2 <sup>nd</sup> U.K. Geosynthetics Lecture (ICE-London) – 2002                                |
| Recipient    | - College of Engineering Lifetime Achievement Award (Drexel University) – 2003                  |
| Honoree      | - Symposium on Research Legacy of R. M. Koerner at Drexel University – 2004                     |
| Recipient    | - 10 <sup>th</sup> T. H. Wu Lecture (Ohio State Univ.) – 2005                                   |
| Recipient    | - 4 <sup>th</sup> U.K. Geosynthetics Lecture (ICE-London) – 2005                                |
| Honoree      | - Robert M. Koerner Symposium on Geosynthetics, ASCE Mechanics Division, Baton Rouge, LA – 2005 |
| Recipient    | - 7 <sup>th</sup> Burmister Lecture (Columbia University) – 2005                                |
| Recipient    | - Award of “Hero” of GeoInstitute of ASCE – 2005                                                |
| Recipient    | - Drexel University College of Engineering, Engineer-of-the-Year – 2006                         |
| Recipient    | - 1 <sup>st</sup> Theodore Sigmon Lecturer (Natl. Acad. Bldg. Insp. Engrs.) – 2007              |
| Recipient    | - 11 <sup>th</sup> Robert L. Schiffman Lecturer (Cornell University) – 2007                     |
| Recipient    | - 3 <sup>rd</sup> H. C. Nutting Lecture (Cincinnati, OH) – 2007                                 |
| Recipient    | - 2 <sup>nd</sup> Distinguished Lecture (Colorado State University) – 2007                      |
| Participant  | - External Advisory Council (University of Delaware) – 2006 to 2008                             |
| Honoree      | - Honorary Membership in International Geosynthetics Society – 2008                             |
| Recipient    | - Diplomat – Geotechnical Engineers Certification – 2009                                        |
| Co-Recipient | - Best Paper in Journal of Geotextiles and Geomembranes – 2010                                  |
| Member       | - Worcester Polytech Deans Advisory Council – 2011                                              |